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WHOLE No. 3092

NEW YORK, SATURDAY, JUNE 9, 1917

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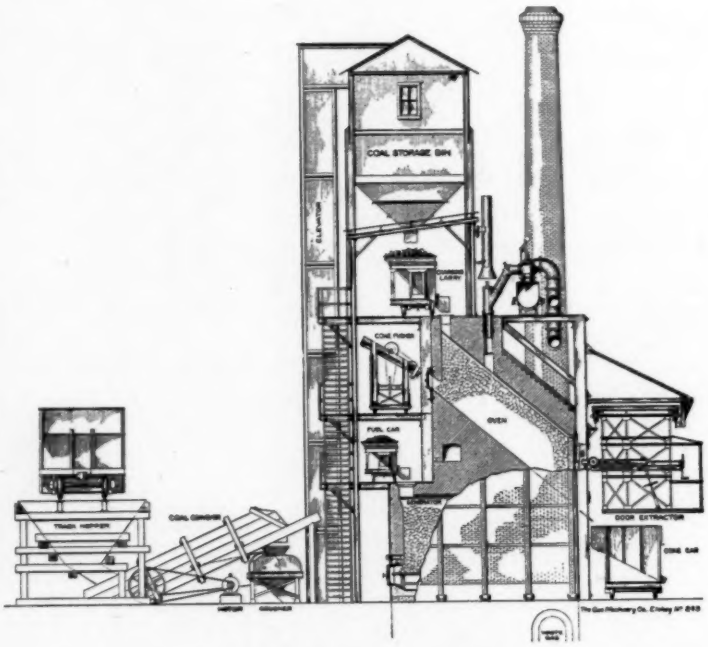

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Vol. CVI, No. 24 NEW YORK, JUNE 9, 1917 Whole No. 3092

Extraction of Light Oils on a Small Scale

Dehydration of Tar and Debenzolizing Not Confined to Large English Gas Companies Alone, but is the Practice in Works Down to Three or Four Million Cubic Feet Capacity

By NORTON H. HUMPHRYS

The dehydration of tar by heating to a temperature of 350 deg. Fahr., or thereabout, also the debenzolizing of tar or oil at a rather lower heat, is not confined to the larger English gas works, but is extensively practiced by all sizes down to three or four millions per annum, and that for two reasons. The first is as a patriotic endeavor to meet the requirements of the Ministry of Munitions, and the second as a commercial proposition on account of the very low prices current for crude tar, as already treated at some length in the writer's monthly letters published from time to time in the AMERICAN GAS ENGINEERING JOURNAL. The dehydrated product alone will realize at least twice as much as the crude material from which it is made, and a considerable quantity of ammoniacal liquor, for which nothing would be paid, is returned to the store well and utilized in the usual way.

By the kindness of friends, I am able to give details and illustrations of three of these small plants, which are fairly representative of the several patterns in use, and would here acknowledge the assistance received from W. J. Rew (Willey & Company, Exeter), H. King Hiller (Cockey & Sons, Frome), W. B. Mimmack, manager, and his assistant, Mr. Tully, of Pembroke Dock. The lettering in Fig. I and II is the same in each case, viz: A. Overhead store tank for supply of crude tar or oil; B. The still; C. Chimney; D. Condensers; E. Distillate receiver; F. Light oil draw off; G. Condensed water draw off; H. Dehydrated tar receptacle; J. Oxide purifier.

The smallest set I have seen is constructed by Messrs. Willey, and shown in Fig. I. The arrangement can be modified to a considerable extent, and for the most part is built up out of material that is likely to be in stock on a gas works, and capable of being pieced together by the handy man. The condensers D are shown as straight lines, carried on brackets on a wall, which is the cheapest arrangement, and easily cleaned, but if space is limited, they can be zig-zagged or convoluted; and the tanks H and E may consist of discarded cast iron meter cases. A boiler of the ordinary plant house type is mounted over a furnace fired with small coke or breeze and supplied from the tank A, in sufficient quantity to maintain the desired temperature at the still outlet, at which as at other cardinal points, thermometers in brass cases are fixed. The working in every case, turns upon the maintenance of pre-arranged degrees of temperature throughout. Over the boiler, which when working is quite filled with liquid, is a cylinder that

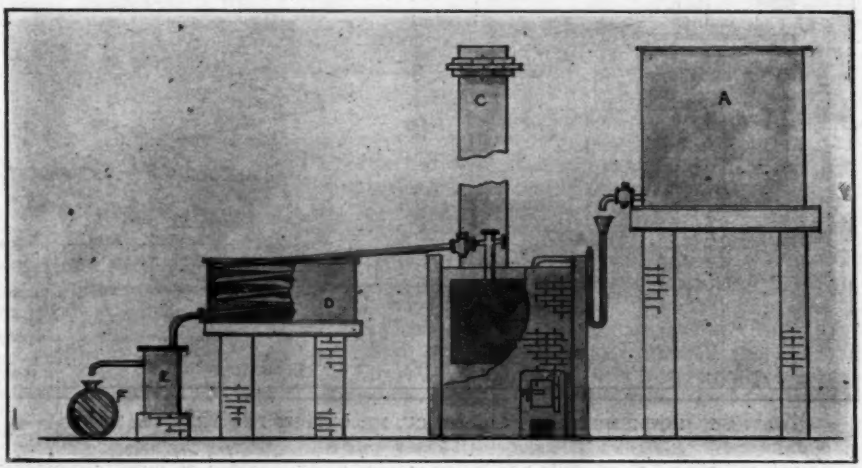

FIG. 1. TAR PLANT IN OPERATION AT PARTICULARLY LOW CAPACITY WORKS

takes care of any frothing, from the top of which the vapors ascend in the first place to the tank, A, and there give up a portion of their heat to the incoming liquid before passing to the condensers D. These are built of ordinary 3-in. and 1-in. wrought-iron pipe, and supplied with water at the outlet end, which passes forward in the annular space between the pipes, and escapes near the inlet end. If it is desired to warm the condenser toward the close of the day's work, to prevent stoppage by deposition of naphthalene, that result can be secured by temporarily stopping the water supply. A similar device is adapted to the hydrated or debenzolized outlet, and the liquids pass off from the base of the cylinder, through the cooler, into the receptacle H. A small oxide purifier, J, is provided for the absorption of sulphurous or other noxious fumes that may be given off, if the plant is situated near to offices or dwelling houses.

The plant as shown is capable of dealing with 400 gal. per day, and the following are the products actually obtained and sold as the result of working up a stock of 17,500 gal. of crude tar which at current prices would have sold for 73 cents per barrel of 42 gal., bringing in a total of $300; 14,200 gal. of dehydrated tar were sold at $2.43 per barrel, equalling nearly $816, and

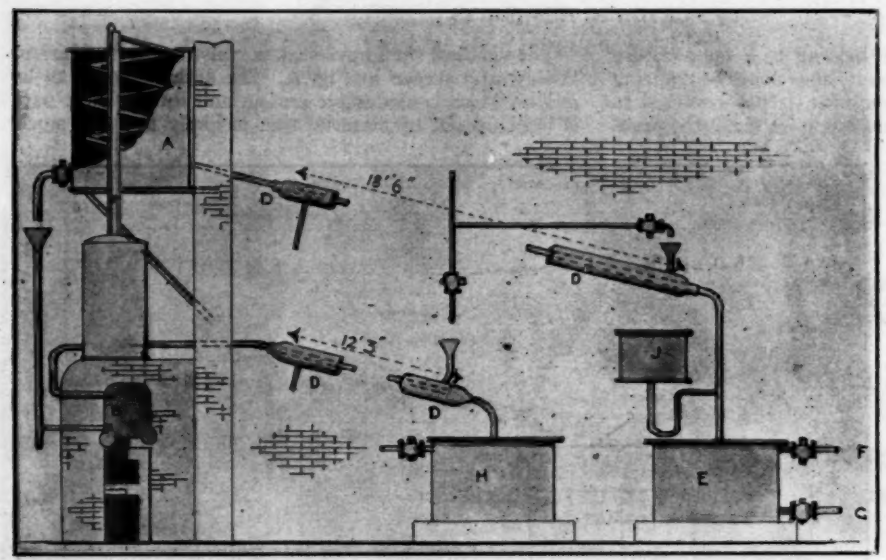

FIG. 2. EQUIPMENT FOR 55,000,000 CU. FT. OUTPUT PER YEAR PLANT

1,640 gal. of light oil at 11 cents per gallon, contributing $182.40; in addition, a quantity of ammoniacal liquor was returned to the store well. The total fuel consumption was four to five tons. An analysis of the light oil as delivered indicated 9½ per cent. of benzol, 7 of toluol, 16 of solvent oil, 4½ of carbolic acid, 53 per cent. creosote oil, and 10 per cent. loss.

Plant at a 55-Million Cubic Foot Works

The H. B. tar plant as manufactured by Messrs. Cockey & Sons, see Fig II, was inspected at a 55-million gas works, and offers facilities for a wide range of operations, the liquid being heated progressively from atmospheric temperature up to the desired point, which may be anywhere between 310 and 450 deg. Fahr. at the still outlet. The arrangement will be obvious, from the preceding description, and it is stocked in three sizes, 25, 50 and 100 gal. per hour respectively. In many cases, special precautions are necessary to avoid trouble from frothing during the first heating, but this arrangement remedies such disadvantage by means of a device which, being at present only provisionally protected, cannot be described in detail. The path of the liquid through the still is somewhat in the form of a wave motion, so that heated tar from the bottom of the still is continuously and automatically brought to the surface, thus overcoming the difficulty of ensuring a natural circulation. The steam and other vapors are readily disengaged on the wave summits, instead of forming in globules at the bottom, rising through the body of the liquid, and by aggregation forming the froth that leads to priming and boiling over. The products are light in color, which proves the absence of any such action, and at the date of my visit the plant was being used alternately for dehydration of tar and debenzolization of oil, and proving equally satisfactory for either purpose.

Equipment at 80-Million Cubic Foot Plant

The Bale & Hardy plant, a photograph of which constitutes Fig. III is erected at an 80-million gas works, and like the foregoing is used as required, either for tar or oil. It is somewhat more elaborate in character, comprising a generator pattern furnace with fire bars on the step grate system to admit of using small fuel, and the usual air ports and dampers. The still or cracking coil consists of 22 2-in. tubes, each 45 in. long, closed up at each end by cast iron return blocks with inspection covers. The feed control lever is connected to a steam throttle valve, and thus regulates automatically the speed of the circulating pump, which is of the plunger type, capable of dealing with 60 to 80 gal. of liquid per hour. There is a preheater, an arrester column consisting of a flanged tee-piece 12 in. diameter, 8 ft. long, packed with inch iron ferrules, and a dephlegmater of similar dimensions and construction. These appliances extract any heavier oils mechanically carried over, return the same to the still, and exercise a beneficial effect by prolonging the working life of the oil used for debenzolizing gas. One or both can be bypassed, if not found to be necessary in the debydration of tar. The distillate receiver contains a ½-in. steam coil, to distil and drive forward any naphthalene that may be deposited. The producer is adapted to burn small breeze, and the rate of flow into the still is visible in the feed control tank. On the delivery side of the pump that supplies the liquid to be treated to the overhead store tank, is an automatic relief valve that releases any excess of back pressure, if such should accumulate.

Oil washing of the gas is used in connection with this plant, the oil being circulated through a five chamber

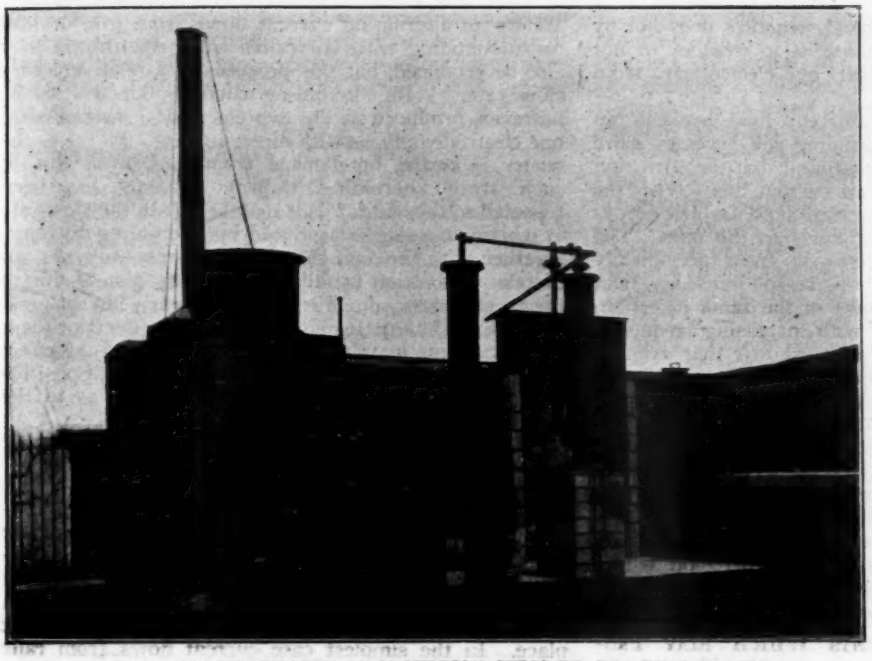

FIG. 3: PLANT ERECTED AT 80 MILLION CUBIC FT. PER YEAR WORKS

bubbling washer of the perpendicular type, having the compartments set one above the other. After twelve hours' circulation the charge of oil is passed into a receiving tank to await debenzolization, its place being supplied by a fresh charge of debenzolization oil, and so the working may be continuous for any length of time.

Electrolysis — Troubles Caused Thereby and Remedies Which May Be Applied

Albert F. Ganz Declares that Iron is Oxidized by Electrolysis at the Rate of Approximately 20 lb. per Year for Every Ampere of Current Flowing from It to the Surrounding Soil, Though This Varies with Surrounding Conditions

Electrolysis is the process of decomposing a chemical compound by means of an electric current. Electrolysis, in the sense in which it will be discussed here, refers to the corrosion of underground metallic structures, such as iron and lead pipes, by stray electric currents which reach these structures and flow to surrounding soil. Soil, when entirely dry, practically does not conduct electric current. Pure water likewise has such a high electrical resistance, compared with iron or lead, that it may be considered a non-conductor. Water is, however, readily made conducting by the addition of even very small amounts of salts, and conduction through water is, therefore, always electrolytic. Soil in its natural state is always moist, and on account of dissolved salts, such as chlorides, nitrates, etc., which are always present, is an electrolytic conductor.

Electric current may be conducted by metallic conduction or by electrolytic conduction. Metallic conduction occurs when an electric current passes through a metal, and is characterized by the fact that no chemical change is produced in the conductor, the only effect being the production of heat. Where electric currents, therefore, pass through metallic conductors, such as copper wires, rails, or pipes, they produce no change in these conductors except to raise their temperature. Electrolytic conduction occurs when an electric current passes through an electrolyte, and is characterized by the fact that chemical decomposition occurs at the electrodes where the current enters and leaves the electrolyte.

Concrete Placed in Earth an Electrolytic Conductor

When an electric current flows from a pipe or other metallic structure to surrounding soil, chemical decomposition of the metal will take place resulting in corrosion of the pipe or structure.

Concrete, when buried in earth, is moist, and it then becomes an electrolytic conductor, so that an electric current flowing from iron to surrounding concrete will corrode the iron by electrolysis.

The mass of a metal corroded by electrolysis in a given time depends only on the "current," and, with the current densities and other conditions usually found in the case of underground pipes, is equal to that calculated by Faraday's law. Iron is oxidized by electrolysis at the rate of approximately 20 lb. per year for every ampere of current flowing from the iron to surrounding soil. Under some conditions, particularly with very small current densities, this corrosion may be considerably greater, while with larger current densities than the above, this corrosion may be considerably less than the theoretical rate. The actual rate may vary in practice from one-half to one and one-half times the theoretical rate, explained Albert F. Ganz, professor of electrical engineering at Stevens Institute of Technology, in a paper presented before the New England Water Works Association.

Appearance of Corroded Metal Structure Does Not of Itself Indicate that it Was Produced by Electrolysis

Lead is oxidized by electrolysis under ordinary conditions in soil at a rate equal to approximately 74 lb. for every ampere of current leaving the lead in one year, and this theoretical rate may also vary somewhat in practice. The amount of corrosion produced by electrolysis is independent of the voltage, except in so far as this determines the amount of current flowing, and the smallest fraction of a volt can produce corrosion from electrolysis under suitable conditions.

The rapid corrosion by electrolysis from external currents is usually localized and results in pitting of the metal. Such pitting may, however, in some cases also result from ordinary soil corrosion, so that the

appearance of a corroded metal structure does not by itself afford conclusive evidence as to whether or not the corrosion was produced by electrolysis from external electric current.

Where the direction of current flow between an underground pipe and surrounding soil reverses more or less continually, it has been found that the corrosion occurring during the time that current flows from the pipe is largely offset by a reversed action which occurs during the time that current flows to the pipe. The resultant corrosion by electrolysis from periodically reversed direct current is for this reason much less than when the current always flows in the same direction, and this corrosion decreases with increasing frequency of reversal. Investigations have shown that even if such reversals occur only once in twenty-four hours the actual amount of corrosion for iron is only about one-fourth of what would occur if the same amount of current always flowed from the pipe to surrounding soil.

When an alternating current of commercial frequency flows between a pipe and surrounding soil, the amount of corrosion produced by electrolysis is of the order of 1 per cent. or less of the corrosion which would be produced by an equal direct current flowing continuously from the pipe to the soil.

Sources of Stray Currents Which May Produce Electrolysis

Electrical distribution systems which are grounded at two or more points will, by the law of divided circuits, cause currents, called "stray currents," to shunt through the earth between the ground points, and these stray currents frequently reach underground metallic structures and corrode them by electrolysis. In practice, it is found that the most important sources of stray electric currents, which so endanger underground structures, are direct-current electric railways, which use the running tracks in contact with ground for part of the electric circuit.

It must be noted that while ordinary soil is a conductor of electricity, its electrical resistivity compared with metals is enormously high, being of the order of millions of times the resistivity of iron. Resistance, however, varies inversely as the cross-section of a conductor, and with the large surface of rails exposed to the earth, the cross-section of the path of current through earth is enormously great compared with the cross-section of the path of current through the rails. As a matter of practice it is often found that where the rails in contact with earth are used alone for the return of current, a considerable portion of the total current leaks from rails through earth.

The leakage of current from the rails of electric railways, producing stray currents through earth and on underground piping, does not constitute a source of loss to the railway company, as for instance would be the case with the leakage of gas or water. On the contrary, by allowing the current to return by earth and underground pipes as well as by way of the rails, the total conductivity of the return circuit is increased, and the voltage loss in the return of this current is decreased, so that there is an actual saving of power for the railway company.

Alternating currents have been used for some years past in a number of electric railways employing the running tracks as a part of the electric circuit, and where these tracks are in contact with earth, stray alternating currents through earth are produced. Where an alternating current flows from iron or lead to surrounding soil, corrosion from electrolysis may also be produced, but this proceeds at a relatively very slow rate. With alternating currents, electrolysis is, however, produced at the two electrodes, instead of at one electrode only, as with direct current. So far as the writer is aware, no damage from electrolysis due to such stray alternating railway currents has been reported to this date. This may be due to the slow rate at which corrosion is produced by alternating currents, together with the fact that most of these railways are of relatively recent installation. It may also be due to the fact that stray direct currents are nearly always present with the alternating currents, and the effects of these direct currents may have inhibited or masked the effect of the alternating currents. It is therefore not possible at this time to draw a positive conclusion as to the danger from stray alternating currents.

General Effects of Stray Electric Currents on Underground Piping

From the explanation of metallic and electrolytic conduction given in the first part of the paper, it will be understood that where stray currents flow on underground pipes they do no harm except where they leave the pipes to flow to the surrounding soil. At such points corrosion of the iron from electrolysis will take place. In the simplest case current flows from rails through earth to the pipes at points distant from the power station, flows on the pipes, and leaves the pipes to return through earth to the rails in the neighborhood of the power station. Where the current flows from the rails to earth, the rails will be corroded, and where the current flows from the pipes to earth, the pipes will be corroded.

If the pipe line is a uniform electrical conductor the pipes will be corroded only in the neighborhood of the power station. If, however, the pipe line is not a uniform conductor, as for instance, if there are one or more high-resistance joints in this pipe line, then the current on the pipe will shunt around such high-resistance joints and produce oxidation or corrosion on the positive sides of the joints.

Where there are two or more underground piping systems it also frequently happens that current shunts from one system to another through the intervening soil, producing electrolytic corrosion where the current leaves the pipes. Such shunting currents are often caused by accidental high-resistance joints in one of the pipe lines, and such shunting may occur anywhere and without reference to the location of the railway power station.

Where a direct-current trolley system passes through a town which has an independent piping network, and where the power station supplying the trolley line is in some other locality, then if stray electric currents are produced by the trolley line where it passes through the town, they will flow on the piping system making this piping system positive to earth and to rails at points nearest the railway power station, and negative at points farthest away from the power station.

For a given current leaving a pipe, there is practically no difference between cast iron, wrought iron and steel in the amount of iron destroyed. The electrical resistivity of cast iron is, however, about ten times as great as that of wrought iron or steel, and the usual lead joints in cast-iron pipes also have a resistance which is many times greater than the screw-coupling joints used with wrought-iron and steel pipes. A given voltage

drop through earth will therefore cause a much smaller current to flow on a cast-iron pipe than on a wrought-iron or steel pipe, thus making cast-iron pipes much less subject to electrolysis than wrought-iron or steel pipes.

Electrolysis Surveys on Underground Piping Systems

In order to determine the electrolysis conditions of an underground water piping system a potential survey and a current survey are generally made. Where it is also desired to determine what remedial measures should be applied for protection against electrolysis, tests of the current and voltage distribution in the grounded circuits of the electric railway system by which the stray currents are produced should also be made.

In the potential survey, voltage measurements between the water pipes and trolley rails and between the water pipes and all other neighboring underground piping and cable systems are made at a number of selected locations. They should preferably be made simultaneously between all of the structures tested at any given location, and either indicating or recording voltmeters may be employed; but the test should be made for a sufficiently long period at each location to cover a complete cycle of car operation. Where the pipe itself is not exposed, connections for these voltmeter measurements may be obtained by means of house service pipes, which are satisfactory for these tests, because the voltmeter has a high resistance and takes only a very small current.

The current survey consists of measurements of current flow on pipes at selected locations in the piping system. To determine the current flowing on a pipe, the voltage drop between two points on a continuous length of pipe is measured by means of a millivoltmeter. From this voltage drop and from the resistance of the included pipe, which may be obtained from published tables, the strength of the current is computed. To measure this drop it is necessary to expose the pipe and to make good electrical contact between the millivoltmeter leads and the pipe. The best contact for these current measurements is obtained by soldering the connecting wires directly to the pipe or to two brass plugs screwed into the pipe. This method is particularly advantageous when readings are to be taken over a considerable time, and it is customary to use rubber-covered wires and bring them to the surface of the street, leaving the ends in service boxes which then form permanent stations for electrical measurements. This is exceedingly convenient because it is then possible to make current measurements on the pipe without again making an excavation.

Important to Know Where Current Leaves Pipe

Since current destroys metal only where it leaves for soil, it is important to know where the current leaves a pipe. Current measurements on pipes are therefore frequently made at two or more stations simultaneously in order to determine the change in current on the pipe between the stations. For these current measurements indicating or recording millivoltmeters are employed. By comparing the characteristic variation of currents and voltages measured for twenty-four hour periods at selected locations with the characteristics of the neighboring electric railways, it is often possible to identify the source of the stray current flowing on a pipe.

From a study of the results of the potential and current surveys it can be determined where current is leaving the piping, and at a number of such points excavations should then be made and the exposed pipe examined with a test hammer for corrosion of the iron. Where corrosion and pitting is found at points where current is leaving the pipe, it may be taken as evidence that at least part if not all of the corrosion has been caused by electrolysis, because it has been conclusively proven that whenever current flows from iron to surrounding natural soil corresponding corrosion of the iron by electrolysis takes place.

From a complete and properly analyzed electrolysis survey, a great deal of good can generally be accomplished. It will not always be possible to remove all stray currents from the pipes, but measures will be indicated by which the conditions can be greatly improved, and points of greatest danger will be located.

Remedial Measures Applied to Pipes

Attempts have been made to protect underground pipes from electrolysis by insulating them from earth by paints or dips. Practical experience as well as a large number of tests have, however, shown that no dip or paint will permanently protect a pipe against electrolysis in wet soil. The first difficulty is to apply the paint so as to form an absolutely perfect coating, and the second one is to prevent mechanical damage to the coating during shipment and installation of the pipe. In the case of paints which are applied with a brush, these afford only a very thin coating over the metal, and where stray currents are present, the effect of these currents and of the moist soil is to cause the coating to disintegrate and disappear rapidly.

A large number of experiments which I have made have shown that such paints will disintegrate not only where the current flow is from the metal to earth but also where the flow is from earth to the metal. Experience further shows that even where coatings of paints or dips are apparently intact, electrolytic action is not always prevented, and, in fact, very serious electrolytic pittings have been found under apparently good coatings.

It has been found that in most cases the applied coatings, have either been completely destroyed by the effects of the wet soil and the electric currents, or defects in the coating have developed, causing concentrated corrosion at such defective spots.

Where it is attempted to apply a heated material like pitch or asphaltum to a cold pipe, it is impossible to completely cover the pipe. Pitch and similar compounds have been applied to pipes with wrappings of jute or of some similar material. A number of layers can be applied in this way so as to build up any desired thickness of insulating covering. Such covering if sufficiently thick will afford protection against electrolysis, provided that it is mechanically perfect. The great difficulty in practice is to apply such a covering without leaving defective spots through which moisture will have access to the metal of the pipe.

Pipes which are covered with imperfect insulating coatings, or coverings exposing bare spots of metal, are in much greater danger from electrolysis where positive to earth than are bare pipes, for the reason that the stray currents will leave only from these bare spots, and here produce concentrated corrosion. The writer has seen cases where a pipe coated with an imperfect insulating covering was pitted nearly through in one year, whereas a bare pipe in the same locality was very

much less affected, because the corrosion was distributed over a larger surface.

One form of insulating covering which appears to afford complete protection is a layer of from one to two inches of a material like coal tar pitch, parolite, or asphaltum, of such a grade that it is not brittle, and so will not crack, but yet is hard enough to remain in place. The best way to apply such a layer is to surround the pipe with a wooden box, support the pipe upon creosoted blocks of wood or upon blocks of glass, and then fill the space between the box and the pipe with the molten material. When applying this material great care must be exercised to avoid getting stones or dirt into the mixture, and also to avoid leaving bare spots on the pipe.

The cost of carrying out such an installation is prohibitive, however, except in very special cases, such as that of service pipes in very bad localities, or that of very important individual pipe lines of small or medium size. Embedding a pipe in cement or concrete, even if this is several inches in thickness, will not protect it from electrolysis, because damp cement or concrete is an electrolytic conductor.

Insulating covering, even if imperfect, is useful on pipes in negative districts where current flows from earth to the pipes, because this covering will increase the resistance from earth to the pipes and thereby correspondingly reduce the amount of current reaching the pipes.

Current Flow in Pipe Lines Can be Practically Prevented

Current flow on metallic pipe lines can be practically prevented by using a sufficient number of insulating joints. A pipe line laid with every joint an insulating joint has a comparatively high resistance and no substantial current can flow on such a line. It is sometimes possible in the case of individual pipe lines to use comparatively few insulating joints to break up the electrical continuity of the line and substantially protect it from electrolysis, but such joints must be installed only after adequate tests have shown that sufficient current will not leave the pipe on the positive side of any joint to flow to earth and do serious damage by electrolysis.

Insulating joints in pipe lines should not be confined to the positive areas, but should be installed in all places along the pipe line where there is any considerable potential gradient in the earth parallel to the pipe. The frequency with which insulating joints must be installed in a pipe line in order to assure reasonable protection from electrolysis depends upon the potential gradient through earth and upon the electrical resistivity of the earth. The effective resistance of a short insulating joint is practically the same as that of a long joint, but a long insulating joint gives a more even distribution of leakage current than a short joint. Hence a long insulating joint is to be preferred where there is considerable potential difference across the joint, or where the resistance of the surrounding earth is low. The effect of a long joint can be practically secured from a short insulating joint by surrounding the joint and the pipe for from 5 to 25 feet on each side of the joint with a heavy layer of insulating material.

Insulating Joints in Service Pipes

Where service pipes are endangered by current which flows to them either from the main or from house piping, such current flow can be prevented and the service pipes protected by placing insulating joints in them at the main or in the building, or at both locations.

Insulating covering and insulating joints can be applied in special cases to individual pipes but cannot ordinarily be applied in an extensive manner to a piping network.

A method of mitigating electrolysis which has frequently been employed in this country is pipe drainage. This consists of connecting the pipes to the railway return circuit at a sufficient number of points to render the pipes at all points negative to the electric railway tracks. Electrical drainage was first applied to lead cable sheaths, and the success in protecting cable sheaths in this manner led to the attempts to apply the drainage method also to pipes. There are marked differences, however, between an underground piping system and a lead cable system, which render the piping system much less suited to electrical drainage. The principal difference is that cable sheaths are continuous electrical conductors, while pipes may be more or less discontinuous owing to the presence of high resistance joints. Another difference is that the lead cable sheaths are relatively small and are carried in ducts, which are mostly non-metallic, so that only a part of the surface of the cables is grounded, whereas underground pipes are buried directly in earth and generally present enormous contact areas to earth. The result is that when electrical drainage is applied to pipes the currents on the pipes are very greatly increased. This increases the danger of current shunting around high resistance joints or leaving the pipe on the positive side of a joint to flow to other structures.

Draining the piping system to the negative bus-bar, when applied as the principal means for mitigating electrolysis, always largely increases the total current flowing on the piping system. When two piping systems, such as a gas and a water piping system, are drained to the negative bus-bar, large currents are caused to flow not only on the water and gas mains, but are frequently also caused to circulate between the gas and water mains through house service connections, because of varying resistances in the pipe joints. Such circulating currents are a serious fire hazard to the buildings through which they pass. Large currents on mains are also dangerous in cases where repairs are being made, because when a pipe carrying a large current is disconnected, an electric arc is produced at the point of separation. I have heard of numerous cases where such arcing set gas or oil on fire, and caused not only damage to property but serious injury to workmen. In many cases where pipe drainage is used such large currents flow on the pipes that it is not safe to disconnect a pipe without first connecting a copper wire jumper across the proposed break.

Current which Jumps Around Joints of High Resistance

Generally the only electrical measurements which are made before and after a system of pipe drainage has been installed are measurements of the potential difference between pipes and the rails. These measurements are ordinarily plotted on a map of the railway system, the values of the potential differences being laid off as normals to the railway lines, and these normals are connected by straight lines. The areas indicating pipes positive to rails are then colored red, and the areas indicating pipes negative to rails are colored blue. Before the pipe drainage is installed there are generally

large red areas, indicating pipes positive to rails, while after the drainage has been installed there are only blue areas. The conclusion is then drawn that since the map giving the measurements after the drainage has been installed shows no red areas, all electrolysis troubles have been eliminated and the piping system is now safe against destruction by electrolysis. This would be true if the piping were a continuous and uniform electrical conductor, and if there were no other underground metallic structures in the earth in the same locality. In any considerable network of underground pipes, there are always joints of widely varying resistances and generally many joints of high resistance, so that current instead of flowing continuously along the pipes may jump around high resistance joints or from one part of the network to another part. The blue areas on the map showing the potentials of the pipes referred to rails of course do not show this. Further, since there are always other underground structures, such as pipes or cables, present in the earth, current may flow between the various structures. The blue colored map also fails to show this. In my opinion a pair of maps, as described above, shown for the purpose of proving that electrolysis has been eliminated on any underground system, are to say the least misleading. The complete data from which to judge the effectiveness of a drainage system would involve the results of many other tests, particularly of currents on pipes, of drop across joints in the pipes, and of potential differences between the drained pipes and all other neighboring underground structures. These additional measurements should be made at a large number of well distributed locations. Owing to the inaccessibility of the pipes, it is generally impossible to make such tests, so that complete data on a system which is drained cannot be practically obtained.

Once electrical drainage is applied, it is usually found that thereafter everything is left to take care of itself, and no attention is paid to the railway return circuit. The writer experienced a most striking example of this in a city in the northern part of New York State a few years ago. It was reported that persons received electric shocks by touching water and gas pipes. Investigation showed that in the neighborhood of the railway substation, where the worst trouble had been experienced, the gas pipes were from 50 to 100 volts positive in potential to the water pipes. Tests made on the tracks in the neighborhood of this station showed practically no current flowing in the rails. Further investigation showed that the water pipes were connected to the negative bus-bar in the station by a large copper cable, and that this cable was draining the entire station load from the water pipes to the negative bus-bar. Still further investigation showed that the connection from the negative return cables to the tracks, directly in front of the substation, had been corroded off so that there was no metallic connection whatever from the tracks to the negative bus-bar, and all of the current was forced to return by way of the earth and underground structures, and finally by the water pipe drainage cable to the negative bus-bar. This condition of affairs had existed for a number of weeks and had not been discovered by the railway company.

When electrical drainage is applied to a single system of underground pipes, without making a complete investigation of the effects of possible high resistance joints, etc., the installation may be made at relatively small cost, and when so applied, it usually relieves the acute danger from electrolysis in the immediate neighborhood where the drainage connections are made. Both of these considerations have served to favor the electrical drainage system. However, a single drained underground piping system becomes a source of serious danger to other systems. If electrical drainage is applied comprehensively to all underground metallic systems, it will not only be found very expensive to install but, likewise, expensive to maintain, because as railway and piping systems are changed, the drainage system must also be changed accordingly. The large increase in current on underground structures produced by electrically draining them also brings about dangerous conditions at scattered and unknown places, which is a serious objection to this method. A further and perhaps the most serious objection to the drainage system is that sufficiently complete tests cannot be practically made to determine whether the drained system is safe or is still in danger from electrolysis.

Gas Engines and Gas Furnaces Used in a Machine Shop to Increase Production

Enable Factory with 7500 Sq. Ft. of Floor Space to Turn Out Quarter of a Million Dollars Worth of Mechanical Specialties in a Year—Without Fine Degree of Accuracy in Heat Treatment Considerable Expensive Waste would be Entailed

At Clifton, Staten Island, there is a small factory known as the Errington Mechanical Laboratory. It occupies the two floors and basement of a brick building and covers a floor space of about 7,500 sq. ft. In spite of this comparatively small floor space, however, it turns out each year about a quarter of a million of dollars' worth of such products as auto-reverse tapping chucks, auto-opening die chucks and other mechanical specialties, many of which are used in the manufacture of automobiles and upon all of which F. A. Errington holds patents.

To secure this large output it has been necessary to make the floor space available just as useful as it is possible to make it. Not a square inch can be wasted. The machinery must be so arranged as to occupy the minimum of space yet allow the maximum of production. The machinery must be of the type that will result in the greatest output of the work being done and so reliable in operation that no shut downs will occur.

Heat Treatment

Practically every article manufactured in the plant must be hardened. Some of the parts are made of high speed steel and some of carbon steel. Many of the parts by the time they reach the furnace have had so much work done upon them that they are already worth as much as $20 each. These parts may be subjected to a heat of 2,100 deg. and if this temperature is allowed to vary even a few degrees above or below the desired temperature the part is spoiled. It is evident, therefore, that the concern cannot afford to use a furnace where the temperatures cannot be very accurately controlled.

Through careful investigation and many experiments Mr. Errington has convinced himself that gas furnaces are superior to all other types of furnaces for his work. When it is known that besides being an inventor this man is an expert mechanical engineer who has been employed in an advisory capacity by some of the largest concerns in America, including the General Electric

Company, and that he has done work not only in America but also in Europe the fact that he decided upon gas furnaces has an added significance.

There are now in operation in the factory three gas furnaces. There is one cylindrical one 12 in. in diameter, one furnace with a 6 x 8 in. opening and one with a 12 x 12 in. opening. A Bristol pyrometer is used to ascertain the exact temperature to which the charge in the furnace is raised.

The furnaces have not only been in use for a considerable length of time but have been operated at high capacity. They have never failed to give satisfactory service, and Mr. Errington states that there is no question about gas furnaces being by far the best furnaces for work of this kind.

Power Plant

In this plant the power is supplied by three gas engines, selected after careful deliberation entirely on the grounds that they represent the most efficient source of power for the purposes for which it is used.

Over in a dark corner there is a 7 hp. Bacchus engine that had not seen service for many months but which was still standing on its foundation and ready to be put into commission on short notice. Next this engine stood a 12-hp. unit of the same make which also was not running but was ready to be started instantly in case of need. The factory has now far outgrown both the 7 hp. and the 12 hp. stage. The engine that was furnishing the power was a 20 hp. Otto.

This is probably as large an engine as will ever be needed until the building is enlarged, for it is difficult to imagine how more work could possibly be squeezed out of the present available floor space. The older engines are held in readiness for emergency service. In case a serious accident should happen to the large engine the 12 hp. could be started at once and soon after the small engine could be thrown into service. Such power insurance results in extremely reliable power and is well worth to a factory operating to full capacity the way this one is the additional investment in engines.

Gas engine drive has become so rare that the temptation to question Mr. Errington in regard to his power plant could not be resisted. In reply to the question: "What do you think of gas engine power?" Mr. Errington said.

"I find gas engine drive cheaper and more satisfactory than any other method of drive. The main reason, however, why I am using it is because it is more reliable. I have extra units which can be thrown into service in case anything happens to the one that is ordinarily relied upon. The gas supply is very reliable and we lose less time from power troubles than we would if we used any other form of power."

Installations Secured on Their Merits

The survey of the plant indicated that this installation of engines and furnaces is being used because of the superior service it is rendering. In the final analysis it is the quality of the service rendered rather than the actual cost of the gas that is being taken into consideration. Such a plant, however, not only shows the faith of the consumer in gas service but indicates the comparative quality of the service rendered by the gas and the electric company. The gas company supplying this consumer is the New York & Richmond Gas Company, Stapleton, S. I. The average gas consumption is about 130,000 cu. ft. per month.

One Woman Working in Laundry Equipped with Labor-Saving Machinery can do Same Amount of Work as Five without Such Facilities

Counselling of Consumers as to Step-Saving Layouts Affords Gas Man a Splendid Opportunity of Furthering Use of His Product—Installations Now May Well Prove Stepping Stone for Future Business

By J. E. BULLARD

It has been estimated that a woman working in a laundry in the home which is equipped with all the modern labor-saving machinery can do as much work as can be done by five equally as energetic women working without any of this machinery. In other words it requires only about one-fifth as much labor to do the laundry work for a family with the aid of machinery as it requires to do it all by hand.

In these days of the almost universal use of labor-saving machinery it has become harder and harder to find any women who are willing and able to do the family washing by hand. War times result in a greater demand for the kind of labor these women can do and makes the difficulty of securing their assistance in household work still greater. Already many of them have demanded more pay for the work they are doing. The demand for labor has become so great that many of these women can secure work in some factory where labor-saving machinery is universally used and where the day's work is not nearly as exacting and possibly not as long as is the wash woman's day's work. The result is that there are fewer women available. This means that something must be done to make the work more attractive in order to attract women who are not already doing this work or, better still, methods adopted that will enable the women who are still willing to do the work to do all the work required.

As has already been stated it has been estimated that with complete labor-saving equipment in the household laundry only one-fifth as much labor is required as in the laundry where all the work is done by hand. There are probably enough women who for one reason or another would not find it practical to go into a factory who could go from one home to another spending from half a day to a day in each and doing the washing and ironing. To enable these women to do all the work required, however, necessitates the installation in each household laundry of all the labor-saving machinery on the market.

The sketch shows the layout of the laundry in an average home. A laundry equipped as shown greatly reduces the work required to do the family washing and also decreases the time required. This means that even at the present high cost of labor the cost of doing the washing will be less than the old method of hand washing and lower paid labor. In other words this machinery starts right in paying for itself as soon as it is installed. It also assists the country in prosecuting the war because it releases labor for more productive work.

In this laundry the clothes start from the chute where they are sorted and then go to the washing machine. After washing, if it is desired to boil them they are placed in the clothes boiler which is heated by the gas stove shown. The clothes that it is not desirable to boil, of course, go through the wringer directly into the

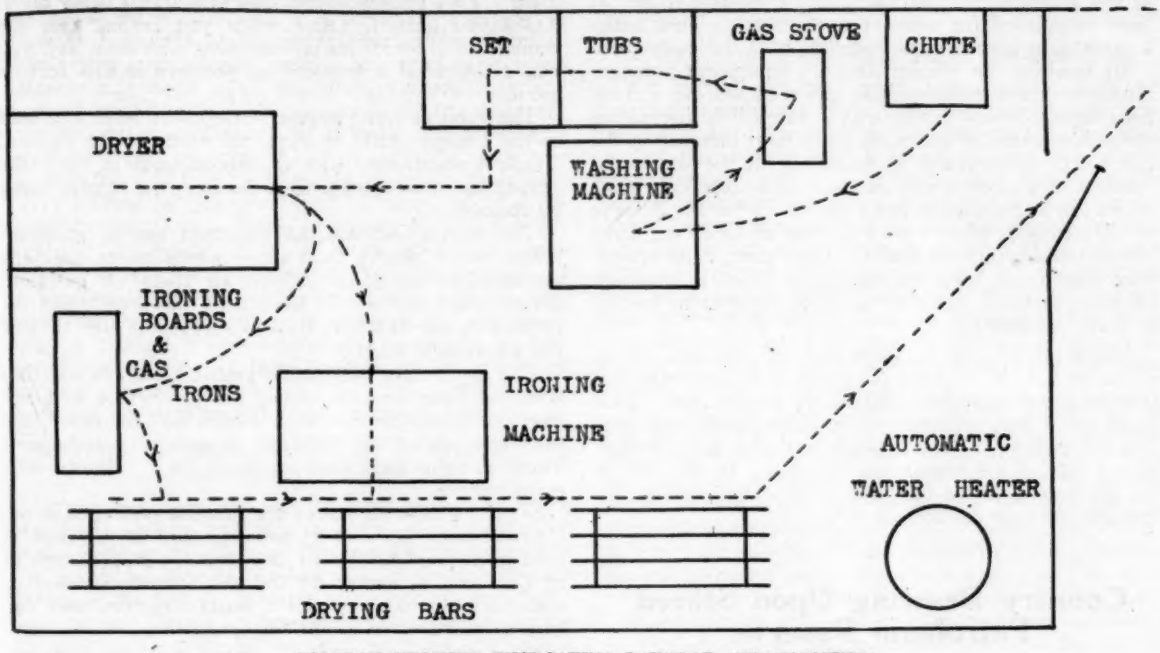

DIAGRAM SHOWING TIME-SAVING LAUNDRY ARRANGEMENT

rinsing water. The boiled clothes go from the boiler into the rinsing tub, then through the wringer into the bluing tub. From this tub they pass through the wringer into a basket not shown on the sketch, or are taken directly from the wringer and placed on the racks of the clothes dryer. This dryer, of course, is heated by gas.

From the dryer the clothes go to the ironing department. The flat pieces are run through the ironing machine which is another gas-heated machine. The other pieces are ironed on the ironing boards by means of gas irons. From the ironing department the clothes go to the drying bars from which they are gathered and put away in their proper places ready to be used again.

An automatic water heater is installed in the laundry to supply the hot water required. There is probably no other work done in the home where an adequate supply of hot water is more urgent than in the laundry. The only gas appliance that can meet these demands with entire satisfaction is the automatic water heater which is always ready for instant service. It is not especially efficient to light a fire an hour or two before the wash woman comes in order to insure enough hot water. The automatic gas water heater does away entirely with the need of any such procedure.

In the laundry there are two power-driven machines, the ironing machine and the washing machine. It will probably be necessary to drive each of these with an electric motor. Each machine, however, will require gas heat. The rolls of the ironing machine are heated directly by gas and the hot water used in the washing machine is heated by gas. In setting up the washing machine there is an advantage in installing a hot water and a cold water outlet directly over the washing machine tub so arranged that they can be connected to the washing machine by means of short lengths of hose. The installation of a connection to the sewer in such a way that the washing machine can be drained directly into it also adds to the efficiency of the laundry.

When the gas man studies how to save labor in the home laundry and how to arrange the appliances in the very best possible manner he is bound to sell a great many more gas-heated laundry appliances than he is when he tries to sell the appliances and leaves it to the purchaser to make the best arrangement of them in her laundry. The object of all machinery is to save labor. The maximum amount of labor, however, is saved only when the machinery is so arranged that the smallest number of steps and motions are required in order to do the work. This principle has been followed in laying out the laundry shown in the sketch.

It would not be possible to arrange every laundry as shown. There is not the floor space in every home that could be given up to such an arrangement. The same principles that are used here, however, can be used in every case. These principles can be reduced to the following rules:

Place the appliances as close together as it is convenient and safe to place them in order that the fewest possible number of steps will be required to go from one to the other.

Arrange the appliances in a sequence which will not require any retracing of steps. Retraced steps result in lost motion and lost energy.

After the layout has been made on paper make a picture of the route over which the work will pass with dotted lines and arrows. This will show whether the sequence of the appliances is correct or not.

A good way to go about making the layout is to draw to scale a plan of the room in which the appliances are to be installed. On this plan locate such utensils as the clothes chute, the set tubs, the automatic water heater and any other fixture that may already be installed and which cannot be readily moved to a new location. Then cut out of cardboard, also to scale, templets which will show the exact amount of floor space required for the different appliances. Arrange these on the floor plan and trace out the route of the work. Make changes

of the arrangement until the shortest possible route has been established for completing the work. Then make a permanent plan for the installation of the equipment.

By working out efficient laundry equipment arrangements *as a war measure*, the gas man will be serving his country's needs in two ways. He will be increasing the consumption of gas with a resultant increase in the gas works by-products so necessary in the successful conduct of a modern war and he will be releasing labor which can be used much more effectively *for the defense of the nation* in other work than that of scrubbing dirty clothes on a scrubbing board. Now, then, is an opportune time to put forth special efforts to install as many efficient domestic laundries as it is possible to install. in every community.

Every ton of coal contains 5 lb. of nitrogen, 60 lb. of tar and 17 lb. of light oil which it is very essential that the government have during the present war. This is wasted if coal is burned in the home rather than gas. The gas man has a duty to perform that is as important as the duty of the man in the trenches. In fact unless the gas man does his part the work of the man in the trenches may go for naught.

Country Drawing Upon Stored Petroleum Reserve

Possibility of Relieving Gasoline Demand by Substitutes from Coal Distillation—Stored Reserve Most Stabilizing Influence in Petroleum Industry

To those who have looked into the insides of this production and consumption of petroleum and gasoline problem, the situation is serious and it is my purpose here to give you a few of the essential facts and allow you to draw your own conclusions as to the remedies that ought to be applied, stated V. H. Manning, Director of the United States Bureau of Mines, in an address before the Editorial Conference of the Business Publishers' Association, at Washington, May 25. I shall transgress from this just for a moment to give you the preliminary thought that, generally as a nation, when it comes to our heritage of splendid natural resources, we are wasteful, apathetic and exceedingly forgetful.

We waste our natural resources with shameful prodigality; we are apathetic of the future. It has been said that we waste our resources like a sailor spends his money on shore leave for the first time in a year, but from what I have seen of our national sin of waste I think we slander the sailor. I preface my remarks with the above because I wish to imprint the thought that any remedy that can be applied to the petroleum and gasoline situation will come through conservation, which does not mean tying up but a wiser use of what we have.

Output of Automobiles in 1916 Alone Account for Half of Total Gasoline Production

In the year 1916 there were 2,750,000 automobiles, or an increase over the year 1910 of 2,350,000.

The increased number of automobiles in 1916 used a billion more gallons of gasoline or 28,000,000 barrels more than the automobiles in 1910.

This increased use of gasoline for the increased number of automobiles alone represented a little more than half of the total output of gasoline in the country in 1916 for all purposes, the total production being about 54,000,000 barrels. And when you realize that the number of automobiles is increasing with each day, you can grasp what a tremendous problem is this feature alone.

The total gasoline engine horsepower built and sold in the United States in 1913, according to the Federal Trade Commission, was 11,200,000, and in 1915 the output had a little more than doubled, the figures being 22,500,000.

The figures indicate the increased use of gasoline-power more clearly than those which cover only the automobiles, as these include all types of gasoline-driven machines which have been developed and increased in use in a way no less surprising than that of the automobile itself.

The apparently unsolvable puzzle about this is that while we have been increasing our production of gasoline, the production of automobiles has increased 200 per cent. above the increase in gasoline production. These are the facts that we must face. Where is it going to end?

Statistics indicate that of the gasoline produced in the United States, between 55 per cent. and 60 per cent. is used in the automobiles of the country; 20 per cent. to 25 per cent. is exported; and the balance is used in stationary engines, in motor boats, tractors and for various purposes of minor importance.

As the highways of the country are improved, the commercial trucks, consuming large quantities of motor fuel, are becoming important means of transportation in many localities. The fishing fleets of our entire coasts have installed gasoline power to replace their original sailing equipment. These fleets, with the many pleasure crafts, operated mostly in the summer months, when the production of gasoline is most heavily taxed, use large quautities of this convenient liquid fuel. There seems no reason to believe that the call for gasoline will in any way be reduced, in fact, a much larger demand seems imminent.

Petroleum for Steam Generation Should be Prohibited

As the production of gasoline depends upon our supply of petroleum, let us look to the source and see what we find. Petroleum and its products have become essential to our very existence. Gasoline is a very important product, but there are many others. The operation of hydroelectric generators, of railway and trolley cars, of the machinery of the factories, of internal-combustion engines, of our battleships and our merchant ships, in fact, of all machinery is made possible by the use of lubricating oils, and these come from petroleum. Petroleum lubricates the machinery of the nation from the handicraft of the watchmaker to the dreadnaught of the Navy.

The industry has progressed since its beginning a little over half a century ago, when it was possible to store the entire production in tin cans and wooden barrels, to the present, when the annual quantity produced requires great steel, concrete, and earthen reservoirs for its storage, great pipe lines for its transportation and fleets of specially constructed vessels for its exportation.

In discussing briefly the supply and demand for petroleum in this country for the last few years, permit me to say that the stored reserve of petroleum is the most stabilizing influence in the industry. I wish also

to bring out the fact that during the last few months our increased consumption has made it necessary to draw oil from this storage, which has convinced many people that our present supply has reached a point where it may never again be sufficient to fill easily the demand placed upon it, unless some radical steps are taken to conserve its use. One of these steps frequently mentioned, and one that is slowly dawning upon our consciousness is that the burning of crude petroleum under boilers for the generation of steam ought to be stopped. In this way large quantities of priceless by-products are being consumed with about the same abandon as an arson fiend destroys valuable property. I understand, however, that some of the western railroads that have been guilty of this practice are beginning to change their oil-burning locomotives to coal locomotives. One of their reasons in the past for burning oil in this manner was that it was then cheaper than coal, but this reason is fast disappearing.

Only 150,000,000 Barrels in Storage at Beginning of Year

In the year 1916, the marketed production of crude petroleum was, according to the estimate of the United States Geological Survey, 295,000,000 barrels. The stocks held by various pipe-line and transportation companies at the end of January, 1916, according to various trade journals, amounted to approximately 170,000,000 barrels; at the end of 1916 the stocks amounted to 150,000,000 barrels, which represents a decline of 20,000,000 barrels, even in the face of our greatest annual marketed production of 295,000,000 barrels.

If consumption of crude petroleum exceeds production, the difference must be drawn from storage. The question that naturally presents itself here is what of the future? During 1915, the normal consumption of crude petroleum was 12 per cent. greater than in 1914; and last year our consumption exceeded the 1915 consumption by 13 per cent. Estimating that the normal peace consumption for this year will increase at the same rate, or 13 per cent., our consumption for 1917 will exceed that for 1916 by about forty million barrels. This does not take into consideration the increased demand for petroleum and its products due to the entrance of this country into the war. Although this increased demand because of the war is difficult to estimate, obviously the increased use for various war purposes will greatly enlarge our consumption above the rate which prevailed during times of peace. The production of crude petroleum in this country during last year is thought to have reached high-water mark, and it is very likely that the production for 1917 will be smaller than it was last year. If the normal and war demands for petroleum can be filled, the difference between the estimated production and consumption during this year will amount to probably as much as 60,000,000 barrels, an amount which must be drawn out of storage. With only about 150,000,000 barrels of crude petroleum in storage at the first of this year, and with the prospects of it becoming necessary to draw from that reserve probably 60,000,000 barrels to fill that demand, it becomes more apparent that some radical steps must be taken to meet the situation.

It may be that as the shortage becomes more apparent the demand may lessen, but the calculations as given show the present tendency of our supply and demand and make it of the most importance to meet the situation with as little confusion as possible in our industrial life and without in any way hampering the outcome of the war.

Extraction of Gasoline from Natural Gas

We should not pass over the situation with an optimistic statement that when the time comes new fields will be discovered, as has happened in the past, or that new methods will be found whereby this threatened shortage will be overcome. We should undertake to anticipate this problem as best we can for we certainly will encounter it in the not distant future.

While the present increase in the number of pleasure cars may not continue, it is plain that the use of gasoline for power in many commercial fields has not yet fully developed, and as this use widens it will more than overcome any falling off in the rate of consumption of gasoline in the cars used for personal purposes, if such falling off should occur.

The fact we must face is that the production of petroleum is not increasing as rapidly as the production and consumption of gasoline. The petroleum in time will reach its maximum production and start to decline. What we are doing now is looking to more efficient methods of production from the oil sands, the production of more gasoline by the so-called cracking process, the extraction of vapors from natural gas, and the utilization of liquid fuels from other than petroleum bases.

More efficient methods of production are now being developed, such as the Smith-Dunn process for forcing oil from the sand by the use of air or gas under pressure.

The cracking of petroleum last year furnished 7½ per cent. of the total gasoline production and can be and is being developed and installed rapidly in most of the larger fields of the United States. Its possibilities are enormous.

The treatment of natural gas by compression, refrigeration and absorption produced 60,000,000 gallons of gasoline of such low boiling point that it was mixed with equal parts of naphtha to form 120,000,000 gallons of good motor fuel. The compression and refrigeration process of extracting gasoline from natural gas, when first used, treated only gases containing three gallons or more of condensable vapors, but at the present time the development of the process and the increased price of the product make gas carrying one gallon profitable. The extraction of gasoline from gases containing less than one gallon and as small a quantity as one pint per 1,000 cu. ft. is now being profitably carried on by the absorption process, which is well adapted to treating lean gases in large volumes. Another source of petroleum which will undoubtedly be developed in time is the shales containing considerable quantities of oil but which, at present prices of crude oil, cannot be extracted commercially.

Substitutes from Distillation of Coal

Substitutes for gasoline, such as the products of the distillation of coal, are being used at present in Europe for motor fuels, and may in time be used for that purpose in this country, as many by-product coke ovens are now being constructed.

In the periods of readjustment and in the development of latent resources, I am hopeful that the Bureau of Mines will play an important part. At present, besides endeavoring to meet the problems of today, the bureau is looking ahead and preparing to aid in solving the problems of tomorrow by investigating the possibilities of increasing the present production.

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Continuing the Pay of Employees While in the Nation's Service

Considerable difference of opinion exists in the gas industry as to the wisdom of making promises to continue employees' pay while in the military service of the Nation, deducting only such sums as the Government may pay them. Some of our best managements have already given such assurances to employees. Other companies no less ably managed have not as yet been heard from.

That a soldier, in addition to offering his life, should not have to make considerable financial sacrifices cannot be gainsaid. That such has been the practice in the majority of cases in all this country's wars—and those of other nations as well—and that patriotism as we have looked upon it in the military sense has consisted in the soldier's willingness to sacrifice his independence of movement, his comforts, his life, perhaps, and even the comfort and happiness of his family does not in the slightest effect the ethics of the matter. Those who go to the front deserve much from the rest of the country not only during the heat of the combat, but in after life as well.

The companies which have given the assurances indicated have acted on this principle. The provisions they make are perhaps provisions that properly should be made by the whole people, but the gas company managements realize that sentiment of such nature is not aroused in a day and do not intend that their employees shall suffer in the meantime.

On a broad principle this journal believes that the relatives and dependents of no man should be called upon to sacrifice in one iota any comfort or convenience that they might have had had the man in question remained at home. An aged parent, an immature child, or a wife who elects to remain in widowhood should her husband be killed, say of a $100 man should receive from the whole people a sum sufficient to continue them in the same mode of living they have been accustomed to. If the man's ability or situation were such that it is logical to suppose that his earnings would increase from year to year and through injury or death in the service of his country such promise should be rendered futile this factor should be taken into consideration and they be recompensed accordingly. The same applies to the $500 man and even to the $10,000-salaried man.

It is to be hoped that in this particular at least, this war and its consequences will be different from any other war this country has engaged in. In the past we have cheered lustily when raw regiments marched past us on their way to the front when they had done no more than merely signified their intention to serve in our behalf.

Those regiments which were fortunate enough to come back when memories of action were still fresh also got their mede of praise, but the cheering was more perfunctory and possessed of less warmth, and in after

life they were forgotten. They mingled among us, but were afforded no special consideration or respect. We even grumbled at the pension appropriations; they were the subject of cynical jests like the Rivers and Harbors "pork" of current memory. Let us in this war at least pay our just debt which we owe to those who bear the real burdens, sustain the real agonies and shoulder the heaviest burdens.

This journal endorses and commends the actions of such managements which have taken the burden which it deems more properly the burden of the whole people on their shoulders. The general public has not yet awakened to its obligations to those who will serve it in the noblest manner a man can serve, with the stake his life. No criticisms, however, should be levelled at such companies which do not do likewise. What is a fair rate for gas in one locality and under given conditions is a woefully inadequate rate in other localities and under other conditions. This applies equally well in the case of compensating absent employees.

Gas for Lighting for the Finer Effects

It is to be hoped that few of our lighting men failed to read the article on the gas lighting installation fronting a dancing academy in Oakland, Cal., which appeared in last week's issue. Here a highly ornamental effect was sought and obtained with gas. In an earlier issue there was described a gas lighting installation for boardwalk illumination at a fashionable seaside resort. In an article shortly to be published in this journal there will be described an installation which replaced electric lighting in a city department store.

All these were placed where attractiveness to the eye are as essential as utility and economy; perhaps more so. Surely there is in these installations, and in dozens of others, a lesson for the gas man.

Unconsciously the gas-lighting salesman has permitted the impression, so aptly expressed by a Middle Western farmer as he stood watching a motor truck recently purchased by his neighbor go tearing by carrying his produce to the city, to become general in regard to gas and electric lighting:

"The hosses is slower," commented this worthy dryly, "but they keep on movin'. They're plain to look at, but they do the work and do it all the time."

In other words utility, combined with drabness, as against uncertainty surrounded by lustre; the appeal of the novel. We have harped continually on cost per candle-power hour, when we could just as well have argued gas lighting's absence of glare, its steadiness, its close approximation to daylight, and the fact that more beautiful lighting effects may be secured with gas than through any artificial lighting agency.

It is, it is true, the faithful, reliable, plodding work horse, but at the same time it may just as aptly be likened to the blooded trotter.

The One and the Many

We were interested some months ago in learning from the autobiography of a prominent writer of light fiction that he was once engaged in the gas business, employed by a small company in the Middle West. In his present calling this man has attained a considerable success. In the gas business, to use his own words, he was "fired." He is a bright man, in fact he might well be called brilliant, but in the gas business he couldn't even hang on. The reason is clear. His gas company connection was merely a job. In his present vocation he has found a task he can put his heart into. In the gas business he might be likened to a fish out of water.

There are many of his kind in the industry to-day. Some of them will hang on indefinitely. Over the heads of others the axe is already poised. Their connection is a necessity to the gas industry. Like all other industries it has need of its pack mules just as it has need of its human dynamos, and their presence does no injury to the industry. Astute managements have gauged their value and pay them accordingly. Nor is there the risk that some cog will slip; something go wrong with the working organizations through some flagrant shortcoming on their part. The pack mule is a type the managements know. They seldom make the mistake of expecting too much of it; a lesson which experience has taught them.

It is the men themselves we should concern ourselves with. They are hopelessly misplaced. In other lines they might go ahead. In their present calling their future is hopeless.

There is no reason why any man with the instinct of accomplishment within him should find it difficult to put his heart into his work in the gas business. It is an old industry. The statement that events travel in cycles is just as apt in its case as in all other human interests. It has had its periods of rapid progress; likewise its periods of marking time. As yet there has been no period of retrogression. The present is a period of rapid progress and expansion. Its greatest point of attainment apparently lies ahead of it. There is ample to stimulate any man's ambition to its highest point. It all depends upon the man and his state of mental attitude.

He who feels himself one of the pack mules should endeavor to arouse himself to an interest in his work. He should not be discouraged by the sight of gray-haired men about him who have apparently gotten nowhere. There are failures in the gas industry just as there are failures in all other callings. If he finds the effort too hard to accomplish he should look elsewhere for his livelihood. The worst cost failure entails lies not in the comforts and conveniences one loses, but in the mental depression and the loss of spirit, not only in business but in everything, that accompanies it.

Publications

How to Build Up Furnace Efficiency

Author, Joseph W. Hays, combustion engineer. Stiff paper bound; 7¼ x 5 in.; 154 pages, illustrated. Publisher, Joseph W. Hays, Rogers Park, Chicago, Ill. Price $1 net.

A unique combination of exceedingly flippant writing and sound common sense and valuable suggestion. The work is intended as a hand book of fuel economy. The author's style is such as to provide downright entertainment in reading even though what might be termed a heavy subject is dealt with. It is even conceivable that many of the fireman class, the dignity and ideals of which the author so frequently assails, might be induced to read it through, and would be sufficiently educated to absorb its teachings. The book is a novelty, and, in the opinion of the reviewer a useful work.

Production of Coal and Coke in Canada

Bulletin 420: By John McLeish, B.A., Chief of Division of Mineral Resources and Statistics, published by the Department of Mines, Mines Branch, Canada. Paper bound, 6½ in. x 9¾ in., 42 pages.

An advanced chapter of the annual report on the Mineral Production of Canada During the Calendar Year of 1915, dealing specifically with coal and coke. Contains general statement of production, distribution, exports, imports and consumption of coal and coke by provinces in Canada. The many tables and statistics give the reports of each company operating in Canada.

Production of Cement, Lime, Clay Products, Stone and Other Structural Materials in Canada

Bulletin 423: By John McLeish, B.A., Chief of the Division of Mineral Resources and Statistics, published by the Department of Mines, Mines Branch, Canada. Paper bound, 6½ in. x 9¾ in., 60 pages.

An advanced chapter of the annual report on the Mineral Production of Canada During the Calendar Year 1915, devoted to the production of cement, lime, clay products, stone and other structural materials in Canada during 1915.

Gives general information, as well as production, exports and imports of the following materials in each province of Canada: Cement, clay building brick, paving brick, fire-clay, sewer-pipe, pottery and earthenware, kaolin, lime, sand-lime brick, sand and gravel, slate, stone, granite, limestone, marble, sandstone.

Catalog—Waterloo Cement Machinery Corporation

Stiff paper bound; size 7¾ in. x 10 in., 48 pages, published by the Waterloo Cement Machinery Corporation, Waterloo, Ia.

An attractively gotten-up booklet, containing many illustrations, as well as specifications and details of construction of each model of the machines made by this company. These include the Wonder Mixers, Builders' Hoists, Trench Pumps, Backfillers, and contractors' equipment.

Benzol as a Motor Fuel

Of the various problems confronting the automobile industry, the motor fuel problem of the future has loomed up as the most important, but it would seem that this problem will temporarily at least be solved, declared Dr. W. F. Rittman in his paper, "One Billion Gallons of Synthetic Gasoline in 1918," presented at the spring meeting of the American Chemical Society at Kansas City. Much discussion and attention is paid to the use of gasoline substitutes, such as alcohol, benzol, gasoline from natural gas, electricity, etc. All of these materials are very valuable sources of power, and the extent of their use is entirely a question of quantity produced, and price. Alcohol is commercial when gasoline exceeds 35 cents per gallon. This price, however, is based on ante-war prices, as every one realizes that the present price of alcohol makes it prohibitive. Benzol, when mixed with gasoline, makes a superior type of motor fuel, and here again it is entirely a question of the supply available. The figures of the best informed people in this field indicate a supply of benzol and light oils available equal to 100,000,000 gallons, which it is observed will fulfill less than 10 per cent. of our motor fuel requirements even though none of the benzol and similar materials were used for explosives and other chemical purposes.

Canadian Coal Production Shows Steady Decrease

The production of coal in Canada during 1915 was 13,267,023 short tons (11,845,556 long tons) valued at $32,111,182 or an average of $2.42 per ton, as compared with a production in 1914 of 13,637,529 short tons (12,176,365 long tons) valued at $33,471,801 or an average of $2.45 per ton, and a production in 1913 of 15,012,178 short tons (13,403,730 long tons) valued at $37,334,940 or an average of $2.49 per ton, according to the annual mineral production report of the Canadian Department of Mines. The falling off in 1915 from the previous year was 370,506 tons or 2.7 per cent. while compared with 1913, the year of greatest production, the decrease was 1,745,155 tons, or about 11.6 per cent.

The values given are partially estimated or assumed since complete returns have not been received with respect to amounts realized from coal sales. In the case of Nova Scotia an average value of $2.50 per long ton is placed upon the total production, while for British Columbia an average value of $3.50 per long ton is used. The values placed upon the Alberta production are those furnished by the operating companies.

The total exports of domestic coal from Canada in 1915 were 1,766,543 tons valued at $5,406,058, as compared with 1,423,126 tons valued at $3,880,175 in 1914. There is also a small export of coal "not the produce of Canada."

The total imports of coal in 1915 were 12,465,902 tons valued at $28,345,605, as compared with imports in 1914 of 14,721,057 tons valued at $39,801,498.

The total consumption of coal in 1915 was 23,906,692 tons, as compared with 26,852,323 tons in 1914 and 31,582,545 tons in 1913.

Bituminous coal constitutes by far the largest proportion of the annual production. Lignite only is produced in Saskatchewan, and in Alberta it forms a large proportion of the Province's production. Of anthracite there is a small output, less than 200,000 tons annually, from one mine, at Bankhead, Alberta.

Speed in Operation of Can-Making Machines at Franco-American Food Plant Accomplished by Gas

Two Body-Forming Machines Each Making a Different Seam Have Output of 120 Cans Per Minute—Gas for Singeing Chickens; also for Hand Seaming

By S. E. WARDELL

All eyes are turning toward national food preparedness in order to meet the uncertain conditions which this country's entrance into the war will inevitably bring about. The nation-wide campaign for home canning and preserving which is now being launched makes this an opportune time to learn how some of the long-established food companies handle the canning end of their business.

The co-operation of the Franco-American Food Company and an inspection of its factory in Jersey City Heights, N. J., has brought out several interesting uses of gas, especially in the making of the cans.

The courteous reception and the urging of visitors to inspect the factory has been in practice by this company since its establishment in 1887, and special hours are arranged for this purpose each morning. Scrupulously clean kitchens and scientific management are the impressions bound to be made.

Singeing by Gas

In the butcher's room, where the meats are handled in wholesale quantities, we find gas being used in the singeing of chickens. A half-inch pipe supplies the gas, which is mixed with air. The fact that one man is continually at this task shows the quantity of chickens used. A large gas range, constructed to meet best the baking and special cooking which is required, is next encountered.

The bulk of the cooking and boiling in the preparation of the soups, meats, plum puddings, etc. is done by steam supplied from coal-fired boilers below.

The Lap Seam Body Former

All the cans used are made on the premises and gas plays an important part in their production. The tin is received in sheets about 2 by 3 ft. square, and after being cut into strips the proper size of the can in the making, by machine, they are conveyed and automatically fed into one of two machines called body formers. In the Continental Body Former, which makes a lap seam, the sheet enters the machine flat, is rolled into shape and then passes under a series of eighteen gas burners so arranged as to heat the tin and the thin film of solder which is applied. The seam is then compressed and the body of the can is ejected, lap-seamed. The flat sheets of tin can be seen in the accompanying illustration as well as the series of burners.

Making of the Lock and Lap Seam

As some cans require a more permanent seam, another body former installed by the E. W. Bliss Company of Brooklyn, accomplishes this, by a lock and a lap seam. The distinguishing characteristics of these two seams may be desirable and are easily explained. The lap seam is merely the overlapping of the two

LAP SEAM BODY FORMER WITH OPERATOR STANDING BEHIND GAS BURNERS

edges of the sheet and soldering and compressing the same, under heat.

With the lock and lap seam, each of the joining edges of the sheet is folded at opposite angles, hooked together, soldered and compressed. This is done on the inside of the can and does not show to any appreciable extent. The burners on the Bliss machine are situated under a solder trough and are used in heating the solder as well as the seam.

A large high pressure blower made by the American Gas Furnace Company supplies the air for the burners on both machines.

They both have an output of 120 cans each per minute and will make any size can from 2½ in. to 5 in. diameter, and a can as small as 2 in. high.

The bottoms of the cans, which are cut out on other machines, are attached to the bodies by means of revolving three wheels against the overlapping bottom, under pressure. An effective seal is thus formed without the use of solder.

Hand Soldering for Defective Cans

Each can is then tested by air pressure under water, and any defective cans are remedied by hand soldering. An ordinary gas-heated soldering iron being used.

After sterlizing and drying, the cans, traveling on special conveyors, are filled to a certain standard and the tops are then put on in a manner similar to the bottoms.

Hand Sealer for Plum-Pudding Cans

An interesting gas-fired hand sealer is used for making plum-pudding cans. The gas is supplied under air pressure. The flame completely envelops the square blunt-shaped iron. The can is fitted over a steel form and held with a vise-like grip only released

by foot pressure, level principle. This is exacting work, and an operator usually turns out from 1,800 to 2,000 cans per day. The odd shape of these cans has shown, so far, that the hand method of making this lap seam is advisable.

In order to prevent fermentation, the sealed tins are placed in large retorts for about an hour at high temperature, which insures the contents remaining good and sound for any length of time. The tins are then sent to the testing room and after being labelled by machine and each can dated, they remain unpacked for two weeks to further insure against any fermentation or bulging of cans. After another inspection, they are ready for packing and shipment.

Brings the Facts Regarding the War Home to the Employees of the Chicago Company

The following editorial from the *Advance Club News* issued by the employees of the Peoples Gas Light & Coke Company of Chicago seems so pertinent as to warrant a much wider circulation than that medium affords:

"Our country is at war! Do we realize what that means? We do not. The merest glimmerings of its significance have come to only the few—probably less than one in a hundred—who have had some near and dear one enlist for service aboard a battleship or the blood-soaked fields of western Europe.

"It is time to wake up. We have already entered the war—the greatest war of all time. Make no mistake about that. We are no longer merely spectators of the tremendous conflict across the sea. We are a part of it and are committed to full participation in it by solemn and deliberate decree of our government; and all the resources of the nation are needed to support America's part in the struggle.

"This war is our war—now. The American people, no less than the French, the British and the rest, are now engaged in life and death struggle with that sinister power of Central Europe which threatens democracy and individual liberty throughout the world.

"Being in the war, America must win. Defeat is unthinkable. The very life of the republic, our future peace and prosperity and liberty, both as a people and as individuals, depend upon winning. For to lose will put us at the mercy of the most destructive, the most ruthless, the most autocratic and the cruelest power the world has ever seen. Therefore, no matter what the cost, no matter how staggering it may appear at the moment, it will cost less to win than to lose.

"The actual fighting of this war is so remote—away off yonder in Europe—it is not strange that we are slow to realize our individual and personal interest in the outcome. But when our own sons and brothers are called for service—the sons and brothers of you who read these lines, and fathers, too, perhaps—and when the long lists of killed and wounded come from the battle front bearing the names of those sons and brothers and fathers—then realization will be brought home to us in tears and blood.

"Do you shrink from that thought? It will be a red reality far beyond the reach of our imaginings, as the current records of European conditions testify in their pictures of crippled men, black-garbed women and orphaned children, unless America puts forth its giant power with a rush that will bring the war to a speedy and victorious end.

"The sooner America's resources in men and money are mobilized for action, the sooner the war will end in victory for our side. That is conceded. The sooner the war ends, the shorter will be the American casualty lists, and the fewer of our sons and brothers will be enrolled there.

"Isn't that worth thinking about? Isn't it an end to be desired and one to be worked for, even at some personal sacrifice?

"War cannot be waged without sacrifice: Sacrifice of blood on the battle front; of money, and of pleasures and comforts money buys, at home. Nobody can escape one sacrifice or the other. We who cannot or who will not be called to take our turn in the trenches and to "go over the top" to the enemy's trenches facing concentrated machine gun fire—the least we ought to do or think of doing is to take up our little share of the burden cheerfully and promptly.

"Support of our government to the limit of our abilities and opportunities in this hour is the solemn and binding duty laid upon each and all of us. Our response to that duty is the measure of our citizenship, the measure of our patriotism, the measure of our regard for the best and freest and happiest country on earth—Our Country.

"The Liberty Loan is the perfect means of giving each of us a chance to do our little bit in this crisis, at the least possible sacrifice. Each purchaser of a Liberty Loan bond becomes a helper in the big enterprise of winning the war.

"Buying a Liberty Loan bond has been made as easy as saving up for Christmas, for a vacation trip, for buying a suit of clothes. It requires no greater personal sacrifice than cutting off a little expense here and there—going without some little luxury or pleasure of the moment that won't be missed the day after it is foregone—and applying those savings a bit at a time to the purchase of a bond.

"Think how small is the sacrifice asked of Liberty Loan bond buyers on these terms, at a time when all must make some sacrifice. The men who go to the front give their lives. Buyers of Liberty Loan bonds do not even give their money. They only lend it to the government on the best security in the world.

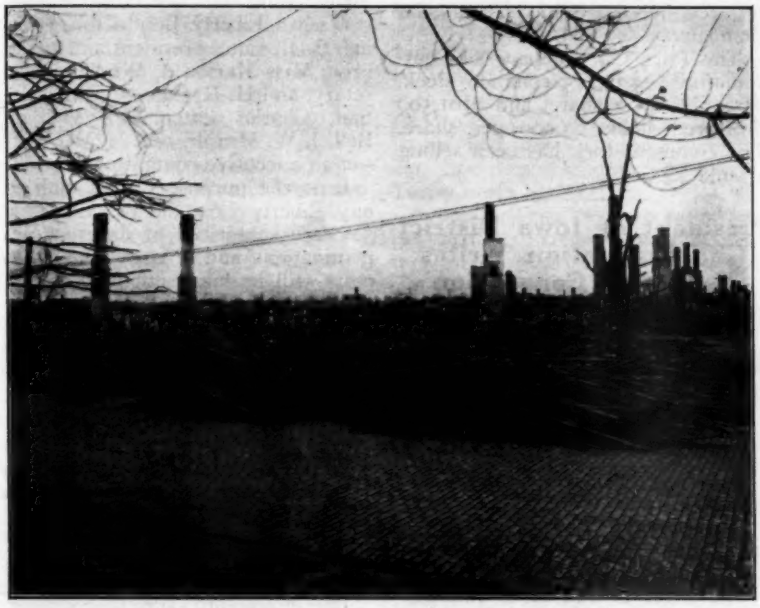
"Buying a Liberty Loan bond, therefore, is not a sacrifice in the real sense of the word: It is making an investment—one that yields a profit in dollars and yields immeasurable, priceless returns in sense of duty well done.

"Where is the sacrifice in shortening a little one's personal expenses for this purpose compared with the satisfaction of holding up your head in prideful consciousness that you, too, are doing your part in the war along with those who go to the front to face machine guns and bayonets?"

Gas Company Billing Lists to Aid Sale of Liberty Loan Bonds

A. F. Hockenbeamer, vice-president and treasurer of the Pacific Gas & Electric Company has offered the suggestion to Secretary of the Treasury McAdoo that the consumers' billing lists of utility bonds be used to aid in the sale of the U. S. Government Liberty Loan Issue. He has placed at the disposal of the Government the names and addresses of his company's 260,000 customers as well as those of the 25,000 holders of its stocks and bonds.

News of the Gas Industry



SERVICE PIPES REMOVED FROM FIRE-SWEPT HOUSES

Fire Causes Enormous Gas Loss at Atlanta, Ga.

Quick Repair Work Stops 1,500 Leaks by Midnight of Second Day—Some Prepayment Meter Cash Saved

Every available man in the service of the Atlanta Gas Company was put to work stopping the enormous leakage through the devastated area of Atlanta, Ga. The figures on the gas company's loss, in gas, reached staggering heights. Nearly 800,000 ft. of gas was lost Monday; on Monday night and Tuesday figures totaled 1,000,000 ft. Gas company men were severely handicapped in the work of stopping the leaks by the hot pipes in the burned district.

R. C. Congdon, manager of the gas company, stated at the time that the gas works could not contend with the present rate of wastage without serious detriment to the supply for the rest of the city, and that the escaping gas in the burned area was reducing considerably the pressure in neighboring mains.

Prepayment Meter Collectors on Duty

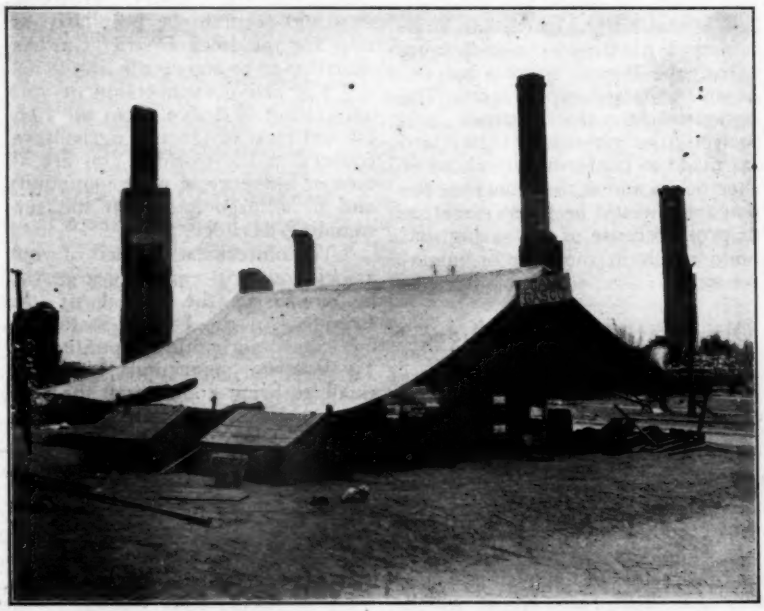
It happened that two collectors of the prepay gas meter department were working the territory swept by the fire that day. Five others were rushed to their aid at 4 o'clock that afternoon. Several had wrenches, and these not only "lifted" the coins from meters but disconnected a large number of straight meters, thereby saving much gas from later waste; and disconnected some gas ranges for people who sought to save them. At least $400 in cash was saved from prepay meters, but that much more at a minimum was lost with meters and all. These men worked under great difficulties and in constant danger of not only being trapped below-stairs by fire but also of being dynamited.

Handled Hot Pipes

Gas company shop and mains men did not hesitate to handle pipes that almost were red hot, and stop their flaming ends with mud or whatever else came to hand. No mains were closed, and every home that stood had its gas service continuously through and after the fire.

Approximately 1,500 gas connections had first to be stopped in whatever way was possible; later, pipes were capped; and finally, each separate service was cut off beneath the ground just inside the sidewalk line, to permit the clearing away of wreckage without further gas damage.

Two days after the fire the bulk of the gas company's work was done.



GAS COMPANY CAMP IN BURNED DISTRICT

Request for Lower Heat Standard in New Jersey

The Public Service Gas Company, of New Jersey, and a number of smaller gas concerns have petitioned the State Public Utilities Commission for a readjustment of the gas standard which has been in force in New Jersey since Oct. 17, 1911. The Public Service asks that if the standard is not lowered it be allowed to increase its rates. The board will hold public hearing on the applications at the State House, Trenton, on Tuesday, June 19, at 11 a.m.

The Public Service in its petition does not suggest any new standard to take the place of the one now existing. It states that since the standard was fixed in 1911 the conditions surrounding the manufacture of gas have materially changed and it is almost impossible to maintain the standard and manufacture gas profitably. The smaller companies which petition recite that during the last two years the costs of coal, coke, and oil, the main elements in gas making, together with the cost of labor, have increased in cost to such an extent that a condition has come into existence whereby the gas companies must have speedy relief if they are to be saved from heavy and unmerited loss.

New Jersey requires every gas company to maintain a gas standard based on a monthly average total heating value of not less than 600 B. T. U., with a minimum which shall never fall below 550 B. T. U. This is materially higher than similar standards used in adjoining States, but it was fixed after exhaustive tests and experiments. The petitioners claim that adequate service would be given if the standard was made to conform with those of other States and at the same time the companies would be given a margin for profit because of the saving that would result in the cost of manufacture.

Ohio Cities to Purchase Pure Oil Company

The following announcement was recently made regarding the sale of the Pure Oil Company: The Ohio Cities Gas Company is to purchase the property of the Pure Oil Company if plans formulated by directors of both companies are ratified by stockholders. An informal session of directors of Ohio Cities Company was held recently, at which the directors approveed plans made by directors of the Pure Oil Company in Pittsburgh the previous Saturday. It stated stockholders of Pure Oil will receive about $25 a share for their stock and will be given an opportunity to become interested in the Ohio Cities Gas Company.

The Pure Oil Company has outstanding $4,535,245 common stock, par value $5 a share, and $101,500 preferred stock, $1,000 per share. The common stock has been selling around 24.

President of Iowa District Gas Association Writes Regarding Convention Postponement

G. I. Vincent, president of the Iowa District Gas Association, and engineer of the Syracuse Lighting Company, Syracuse, N. Y., has recently sent a personal letter to each of the members of the Iowa District Gas Association, telling some of the reasons why the officers and directors had decided not to draw the men away from their homes even for a few days at this time.

The letter in full is as follows:

"Under date of May 10 you were advised by Mr. Keffer, secretary and treasurer, of the action of your Council in postponing the meeting of the association.

"You are, no doubt, aware of the reasons underlying this action by your association, and by a large majority of the associations throughout the country. However, it would seem to be peculiarly fitting for the Iowa District Gas Association to be among the first to act.

"The active membership of your association is drawn from the richest and most productive agricultural country in the world. You are all men of influence in your community and to a large extent in the surrounding territory.

"The officers and council of your association most earnestly urge you to emphasize the appeal of the President of the United States for increased agricultural production. To lose no opportunity, however small, to bring home to all the very great gravity of the situation.

"It is needless to say more. Statistics could be piled on statistics, and figures multiplied by figures without adding to that which you already know.

"I believe that at this time this is the very biggest 'bit' we can do.

"Very truly yours,

"(Signed) G. I. VINCENT,
"President."

Haverhill Company Forms Liberty Bond Club

The employees of the Haverhill Gas Light Company met recently at the offices of the corporation and organized a Liberty Bond Club, electing H. R. Cate, president and treasurer; Miss Marion A. Whaland, secretary, and H. R. Cate, J. W. Christian, Charles Otten, Jr., William Bell, J. W. Murphy and M. W. Watson an executive committee.

It is the purpose of the club to buy Liberty Loan bonds and some 30 were subscribed of different denominations and it is expected that more will be taken out later. It is planned that the bonds be paid for at the rate of $1 a week for a $50 bond and $2 a week for a $100 bond, thereby cleaning up the payments in 50 weeks, the bonds to be taken by the corporation.

Summer Session at University of Wisconsin College of Engineering Soon to Begin

The nineteenth annual Summer Session of the College of Engineering of the University of Wisconsin will be held at Madison during the six weeks' period beginning June 25, 1917.

Special courses will be given in chemistry, electrical, steam, and hydraulic engineering, gas engines, machine design, mechanical drawing, mechanics, shop work, and surveying. All courses given in the University Summer Session are open to engineering students.

Special courses have been arranged for engineering, manual arts and vocational teachers.

For information, address F. E. Turneaure, Dean, Madison, Wisconsin.

Franchise Asked at Thief Falls, Minn.

An ordinance was introduced before the city council of Thief Falls, Minn., recently and given its first reading, granting a gas franchise to the Public Improvement Company of Minneapolis, which is constructing gas plants at Bemidji and Montevideo. The company expects to lay ten miles of mains this summer in addition to building a plant and having the same in operation late this fall. The estimated cost of the plant will be in the neighborhood of $70,000.

Chicago Committee Votes New Gas Rate Ordinance

The city council committee of Chicago on gas, oil and electric light, recently by unanimous vote recommended for passage a new gas rate ordinance, which provides for both retail and wholesale rates.

Here is the rate schedule:

Forty cents for the first 350 cu. ft. or less used per month.

Seventy cents for each 1,000 cu. ft. in excess of 350 ft. and not more than 10,000 ft.

Sixty-five cents for each 1,000 ft. in excess of 10,000 and not more than 50,000.

Forty cents for each 1,000 cu. ft. in excess of 50,000.

By the establishment of wholesale rates it is claimed the Peoples Gas Light & Coke Company will be able to develop its sales to large consumers, which ultimately will mean lower priced gas for all consumers.

Large consumers also will be charged minimum monthly bills, but this will not affect the average householder.

The following set of minimum monthly bills and minimum monthly charges for the first 350 ft. of gas burned each month was approved:

Meter size.	Minimum monthly bill.	Minimum mo. charge for first 350 cu. ft.
20 light	$ .50	$ .40
30 light	1.00	.50
45 light	1.25	.60
60 light	1.50	.75
100 light	2.00	.90
150 light	2.50	1.15
200 light	3.00	1.35
250 light	4.00	1.50
300 light	5.00	1.75
400 light	6.00	2.00

Under the terms of the measure the company agrees to build a " coke oven " plant within three years and establish a profit-sharing plan for consumers.

Twelfth Well Struck on One Ohio Farm

The E. H. Everett Company has brought in a new well, No. 12, O'Bannon, 12 miles east of Newark, Ohio. It is probably one of the best wells that has ever been drilled in the Clinton Sand, and is good for from 300 to 400 barrels.

This is the twelfth producer on the T. S. O'Bannon farm, each ranging from 100 to 300 barrels. This journal is indebted to J. M. Keckley, manager of the E. H. Everett Company for the above information.

Program for Special Meeting of the American Gas Institute, June 12

The following program has been announced by Geo. G. Ramsdel, secretary for the meeting to be held June 12:

First. The Special Meeting will open Tuesday morning, June 12, at 10.30 o'clock, in the No. 1 Assembly Room, fifth floor, United Engineering Societies Building, 29 West Thirty-ninth Street, New York City.

Second. The meeting is called for the purpose of considering such matters as have arisen from present war conditions.

Third. The Committee on the Relations of the Gas Industry to the Military Needs of the Nation will present a report.

Fourth. It is expected that work now in progress will have so far advanced that very valuable information on the important subject of coal supply will be available and will be presented.

Fifth. Arrangements are being made to have luncheon served in the building, at which time a short address will be made by a speaker well versed in military matters, on a subject that will be appropriate to the occasion.

Owing to the facilities for serving the luncheon, the number will be limited to probably about 150, and as many more as can be served. As the registration is now well over 300 the necessity for a prompt reply is apparent.

The luncheon will not exceed $1.50 in price.

It is to be hoped members will avail themselves of this luncheon, as it will save valuable time and afford a social opportunity.

Postponed Convention Papers to be Given Publicity

While the Board of Directors of the National Commercial Gas Association has decided to cancel the Detroit convention, we are informed by Louis Stotz, secretary, that it is not their intention to curtail the activities of the association or the work of the committees or authors of the papers.

All the papers which were to be prepared for the convention, as well as the reports of committees, will be published in the bulletin of the association, and later on in the journals of the gas field. Written discussions by members will then be in order for future publication.

Gas Equipped Central Depot for Instruction in Canning and Preserving Opened on Long Island

Long Island Food Reserve Battalion to Preserve, Store and Sell Farm Products—to Educate and Help Housewives — Increased Gas Consumption a Positive Result

Working with the same end in view as that which is prompting the National Commercial Gas Association in its present campaign, namely to increase home canning and preserving, a group of women have recently made a tour of Long Island. Freight cars equipped as kitchens served as demonstration booths. At each stop a call was sent to the women of the surrounding vicinity to come and learn and to tell what they knew.

This traveling campaign has been followed by the establishment of a Central Depot and Kitchen at Hicksville, L. I., which was opened June 1. A large store has been remodelled, and the extension in the rear has been equipped as a modern kitchen. A long gas range, having a 2-in. feed pipe, has been installed, and will provide ample space for the wholesale cooking and preparation which will be done. Two good sized sinks and gas-heated boiler equipment will provide the necessary hot water.

The object, as advertised on display bulletins about the country, is to instruct in canning, drying, salting, preserving and general thrift. All garden and farm products are to be collected, preserved and stored for future use.

An appeal has been made to get the farmers to plant just a little more and donate that to the Depot. On Monday, Tuesday and Wednesday, the products will be preserved under competent instructors, stored and later sold under the auspices of the Long Island Food Reserve Battalion. In the disposal of these goods, the needs of the community will be considered first. All those who volunteer to work for the good of the country on these days have the best instruction possible to look to as their reward. During the remaining days, the kitchen will be open for use under instructors, for all wishing to preserve their own vegetables. A small charge will be made for gas and water on these days.

The women who have started this

kitchen and a similar one in Manhasset, L. I., are: Mrs. Arthur Burden, Mrs. J. Burden, Jr., Mrs. Herbert Harriman, Mrs. George Kent, Mrs. William Laimbeer, Mrs. H. J. Nichols, Mrs. W. K. Vanderbilt, Jr., and Mrs. J. W. Webb.

A large number of postals have been sent out asking whether the receiver will contribute vegetables, jars, etc., and whether they will volunteer, and what day they will use the kitchen for their own work.

When once the women have been shown the most modern methods of cooking and sealing to prevent fermentation by such a direct method as that furnished by a community cannery, the value to the gas companies is beyond estimate. For many are the households that do not now taste the luxuries of home-preserved foods, but that once the value is shown and the products are tasted, will demand it each year, only in larger quantities. The increased consumption of gas with its accompanying increase in revenue for gas companies is a result which can easily be foreseen. Using the figures in one of the pamphlets issued by the N. C. G. A.: "it can be confidently assumed that among the 20,000,000 gas consumers of the United States, a campaign of the magnitude and character outlined, will bring about an increased consumption of gas in the household amounting to at least 25 cents per month per consumer, on the average. Between June and November, this will mean an increase in revenue of $20,000,000 to $30,000,000 for the gas industry."

This is a wonderful opportunity for the gas companies, and the more Central Depots and Kitchens which are established, the quicker will spread the slogan "Can Your Bit."

$100,000 Liberty Bonds is Baltimore Company's Subscription

The Consolidated Gas, Electric Light & Power Company of Baltimore have recently subscribed to $100,000 worth of Liberty Bonds, in accordance with the authorization given at a recent executive meeting.

As their letter to the Liberty Loan Committee for Maryland states: "This will be followed later by another substantial subscription on behalf of our employees who are now sending in their subscriptions under a 50-week-payment plan, by means of which we are assisting in making their subscriptions easier."

Merger Planned for Indiana Natural Gas and Oil Properties

The following notice has been published regarding proposed transfer of Indiana properties.

"The Indiana Natural Gas & Oil Company and the Kokomo Natural Gas & Oil Company, operating natural gas utilities in Kokomo, Indiana, with their principal office and place of business in said city, have filed with the Public Service Commission of Indiana a petition for authority to transfer the property of the Kokomo Natural Gas & Oil Company to the Indiana Natural Gas & Oil Company.

"There will be a hearing at the office of the Public Service Commission of Indiana, State House, Indianapolis, Indiana, on the 28th day of May, at 10 o'clock A.M., for those desiring to protest in this case.

"It will be one of the policies of the Public Service Commission of Indiana to keep all people interested in such matters fully advised so that they may be heard, if they so desire.

"Yours very truly,

"CARL A. MOTE, Secretary."

Summer Hotel Proprietors Investigate Gas Cooking

A demonstration of Garland Gas Ranges was recently conducted by the North Adams (Mass.) Gas Light Company, whose territory embraces some of the most delightful Berkshire Mountain country, in northwestern Massachusetts. The proprietors of a large number of hotels and restaurants visited the demonstration and were impressed with the convenience and economy of gas cooking. It is expected that a number will adopt it.

John V. Peck, of the Michigan Stove Company, manufacturers of the Garland Range, and Thomas H. Henderson, of the gas company, were in charge of the exhibit.

Coke Price $1 More than Coal

Stating that there was an insistent demand for coke due to the delay in getting coal, the New England Gas & Coke Company recently raised the price of coke $1 a ton, assigning as a reason an attempt to check the demand long enough for the company to catch up with their orders.

This increase brought the price of coke to $10.50, which is $1 a ton more than the price of coal.

Rate Increase by Natural Gas Company in New York State

An increase of five cents per 1,000 cu. ft. has been announced by the Pavilion Natural Gas Company which supplies gas to Avon, N. Y., and the surrounding towns. Practically every home in the village is piped for gas. The gas company says that the cost of drilling wells has trebled in the past year.

Hotel and Other Gas Installations at Atlanta

Three sections of heavy duty hotel ranges and one large hotel broiler were installed by the Atlanta Gas Light Company in the Hotel Winecoff, Atlanta, Ga., between the late evening of May 11 and daylight next morning, according to the house organ of the company. Without anyone outside the hotel kitchen knowing of the substitution, breakfast for all the guests was cooked with gas, May 12. The hotel's former equipment of coal ranges and broilers was removed.

According to I. H. Morehead, Jr., gas salesman, the chef, the steward, the manager, and everybody else around the Winecoff who has had occasion to watch the performance of the new gas equipment is delighted with it.

Other large gas installations reported by Mr. Morehead as having been made within the past month are these: gas steam radiators in the new Calvary Methodist Church on Gordon Street; gas steam radiators throughout the Haynes Building, now being remodeled at Peachtree and Auburn Avenue and to be occupied by eleven tenants; a candy furnace sold to Frank E. Block Company; industrial burner for 300-gal. cauldron furnace, for Southern Products Chemical Company; and several industrial gas burners for Atlanta Mirror & Beveling Company.

Wyoming Oil and Gas Lease Rates Increase

Leasers of oil or gas-producing lands in Wyoming hereafter will pay a royalty of 12½ per cent of the value of the production taken out, instead of 10 per cent, as at present, as the result of recent action by the state board. Increased demand for leases is said to have prompted the action.

A. G. I. and N. C. G. A. Combine to Help Liberty Loan

A four-page folder has recently been sent to all the gas companies in this country, in an effort to enlist their aid in making of the Liberty Loan a real American success. The letter on the first page, with the heading "National Duty" was signed by George G. Ramsdell and Louis Stotz, secretaries of the American Gas Institute and the National Commercial Gas Association, respectively.

Speaking for the associations, it points out the great importance of enlisting the support and interest of all gas company employees in the Liberty Loan. It further suggests that a copy of the "Special Notice to All Employees," which occupies the second page of the folder, and a subscription blank, be placed in the hands of every employee. The simple arrangements for financing these subscriptions are also explained. It is needless to say that this is one of the most patriotic steps any company can take.

Increase Asked for Eau Claire, Wis., Rates

The Wisconsin-Minnesota Light & Power Company has petitioned the Railroad Commission for authority to make an emergency increase in gas rates in Eau Claire, Wis.

Some of the points brought out in the petition are as follows:

At the time said tariff was filed and when said rates became effective, the Wisconsin-Minnesota Light & Power Company was paying for gas coal delivered on docks at Lake Michigan ports $3 per ton and a freight rate of $1 per ton from the dock's to the company's gas plant at Eau Claire, making a total cost of $4 per ton f.o.b the company's gas plant at Eau Claire, and at that time the company was selling the coke manufactured at its Eau Claire gas plant at $5.15 per ton.

Since said tariff was filed and became effective the price of gas coal on the docks at Lake Michigan ports has advanced from $3 per ton to $6.50 per ton, making the cost at petitioner's gas plant at Eau Claire $7.50 per ton, and petitioner anticipates that the cost of coal at petitioner's gas plant at Eau Claire, Wisconsin, will be further advanced by an increase in freight rates between Lake Michigan ports and petitioner's gas plant.

Petitioner has advanced the price of coke manufactured at its Eau Claire gas plant to $8 per ton.

During the period of ten months ending April 30, 1917, petitioner carbonized at its Eau Claire gas plant 5,037 tons of coal, and during said period it distributed and sold to the public from its gas plant at Eau Claire 46,615,800 cu. ft. of gas and 3,162 tons of coke; that being the entire salable output of gas and coke produced by the coal carbonized during said period.

After a statement of the receipts and disbursements for the last ten months and a reference to the increase in cost of materials and labor the petition goes on to say:

Wherefore, petitioner asks leave of the Railroad Commission of Wisconsin to file a temporary emergency tariff, effective on all meter readings after July 1, 1917, increasing the rates of gas now in effect at Eau Claire, Wisconsin, under petitioner's tariff hereinbefore described, six cents per thousand feet for each $1 that the average price of coal to the petitioner at its gas plant at Eau Claire, Wisconsin, in the two calendar months immediately preceding the month in which the meter is read shall have exceeded $4 per ton, such rate thereafter to increase or decrease automatically following an increase or decrease in the price of coal on the ratio of six cents per thousand feet of gas sold to $1 per ton of coal carbonized.

WISCONSIN-MINNESOTA LIGHT & POWER COMPANY,
By J. H. Brewer, President.

The hearing on the application was held at the auditorium of the public library, Eau Claire, at ten o'clock a. m. June 8, 1917, at which time all parties interested were heard.

Store Lighting Lecture Available

The Illuminating Engineering Society announces that a lecture on Store Lighting is now ready for delivery to those who wish to present this phase of the art and science of lighting. The lecture is designed to fit the need of anyone, who is called upon to present the principles involved and the advantages of a well lighted shop, store, show-window or show-case.

The manuscript covers some twenty typewritten pages and is accompanied by sixty lantern-slides illustrating actual lighting equipments and showing diagrams of various types of lamps, globes, shades, reflectors and fixtures. All of these are descriptive of equipments for store installation. A number of slides illustrate the principles involved and the items of importance to be considered in laying out a plan for store lighting.

It is expected that there will be a demand for this lecture among proprietors, managers, decorators and others interested in the importance of correct illumination. The lecture is well adapted for presentation before salesmen, fixture manufacturers, and those who manufacture and distribute lighting accessories. Still another field is that of municipal authorities who take an interest in the appearance of the sidewalks and highways as affected by store illumination.

The lecture may be reserved for presentation upon application to the Illuminating Engineering Society, 29 West Thirty-ninth Street, New York City. A number of advance reservations already have been made. The Society provides the lecture and slides at a nominal service-charge intended to cover only the cost of maintenance and postage.

Another lecture, on Home Lighting, will be available within a short time, while the Committee on Popular Lectures is actively engaged in the completion of lectures on other phases of illumination.

Salem Gas Light Company Wins in Stock Issue Case

A decision of considerable importance, as reflecting the attitude of a majority of the Board on matters of capitalization, was rendered May 21 by the Massachusetts Gas & Electric Light Commission on a petition of the Salem Gas Light Company for authorization of an issue of $409,300 par value of new stock at $130 per share. Two commissioners—Chairman Weed and Commissioner Schaff—approved an issue covering floating debt, while Commissioner Lewenberg, the latest appointee, dissented from the majority.

Since the last approval of stock the Salem company made expenditures aggregating $403,000 in excess of the provision made in the last stock issue. Notes outstanding last June amounted to $433,000. Additions to plant, estimated to cost over $95,000, will ultimately be made

when stock and labor conditions improve.

"In opposing the company's application," the Commission's majority decision says, "no serious questions were raised by the cities as to the propriety and reasonableness of the company's expenditure upon its property. It was claimed, however, and supported by a painstaking exhibit and earnest argument, that the cost of the existing plant and property actually used and necessary for the production and distribution of gas, less the depreciation which such plant and property has suffered, exceeds the outstanding capital stock and the debt which the company now desires to convert into additional capital stock. This depreciated cost was stated to be $798,000, as against the company's book value of $1,079,907; and it was urged that only the excess of the former figure over the outstanding capital stock of $499,600 and the premium of $74,800 paid in thereon should be capitalized.

"The theories of depreciation commonly used in valuations of public utilities are so flexible that the great differences in the resulting figures tend in many instances to confound rather than confirm the judgment in giving full reliance to any of them. Without passing upon the reasonableness of the rates of depreciation applied to the property in question or discussing the vital business issues involved in the determination of an impairment of capital, the history of the company discloses that for a period of 30 years—from 1874 to 1904—this company raised no additional capital, although during this period its profits were such as to enable it not only to pay fair dividends, but also to purchase the site for and erect a substantial part of its present works, coal wharf and shed, and to make considerable extensions of its mains; that when the Board in 1907 gave a hearing relative to a reduction in price, the representatives of the city urged that the provision for repairs and renewals charged to operating accounts were and had been excessive and that the consumers should no longer contribute in the price, in addition to a fair return, the capital necessary for their own supply; and that since 1904 the output of the company has more than doubled and the expenditures on generating and distribution systems, which had to be made to meet the demands of this growing output, and not covered in prior stock issues, were financed by the outstanding obligations.

"It is true that when a company, which has been in active and successful operation for a considerable period of years, undertakes to convert its floating debt into permanent securities, the question is not to be settled merely by the relation of such debt to expenditures upon construction, but involves an inquiry into the fair relation of the assets and liabilities and the adequacy of the provision made for depreciation from the standpoint not only of the public, but of the stockholders, as well.

"It is equally true that cost of property, less depreciation, may or may not be equivalent to its 'fair structural value,' should such an inquiry involve the question of impairment of capital. While the Board is satisfied that it is of the utmost interest to the consumers, as well as the stockholders, that the capital of the companies under its supervision shall be kept as low as circumstances will admit, it is also true in the interest of the communities which they serve, that they shall be able readily to obtain all the money necessary for furnishing adequate and efficient facilities for such service, and that they shall not be hampered in so doing save in cases where the evidence of impairment of capital is clear and convincing.

"On the other hand, it is equally clear that unless ample provisions are made for depreciation and a conservative policy as to dividends be maintained, the duty must sooner or later fall upon the Board in deciding applications for approval of additional stock to compel, through its refusal to capitalize obligations, the devotion of resources to keep the capital good.

"With these considerations in mind and having regard to all the circumstances connected with the creation of the present debt, a majority of the Board feels justified in the approval of stock to the amount herein mentioned. In view of the company's position with respect to the work in contemplation, provision for it by the issue of stock may well be postponed."

Hence, the Board approves 3,100 shares, to be issued at $130.

Commissioner Salomon Lewenberg, in his dissenting opinion, says that as an inducement to stockholders to put in additional capital, it is a proper practice to allow a fair margin between the market value and the price to be charged for the new shares. "Until the dividends on the stock of public utility corporations are limited by law," he says, "there will continue to be opportunity in the decisions of supervisory boards on new stock issues to help stockholders, to use a popular expression, 'to cut a melon.' In the present case the 'melon' is $60,000 larger than it ought to be."

To the argument that marking up the price of new issues increases the rate of dividends, the commissioner points out that the dividends were marked up in the past when the stockholders were getting the new issues at a much lower price than the market selling price.

It's Handed To You
AND CONNECTED, TOO!
Your Choice of the New 1917 Model
GAS RANGES AND WATER HEATERS
You do not have to pay a cent down. The first payment is made with your April gas bill, and the remainder is divided into easy monthly installments.
The sooner you place your order the longer you will have to use the range before the first payment is due.
Call at our store or phone St. Paul 8000 and our representative will call upon you.
THE GAS & ELECTRIC CO.

NEWSPAPER ADVERTISEMENT USED IN BALTIMORE PAPERS

Impressive Advertising in Baltimore Papers Makes Results Sure

Among the many profitable advertisements inserted by the Consolidated Gas, Electric Light & Power Company of Baltimore, the one illustrated above seems to stand out.

The close connection between the illustration showing the hand and gas range, and the attention-getting caption, "It's handed to you and connected, too," makes it an advertisement very hard to pass by, when glancing through a paper.

Results are sure when such simplicity is employed. This is a consistent policy with the Baltimore company as can be found in almost any of their numerous advertisements.

Gas in a Modern Clubhouse

The industrial department of the Public Service Gas Company of New Jersey has recently closed a contract with the Carteret Club, Jersey City, for an all-gas restaurant equipment amounting to $1,833, according to the account given in the April *Service*, which is published by this company. In connection with this equipment they succeeded in altering the original plans which called for all electric lighting and secured forty-one outlets for gas lighting and conceal-o plates. Four fireplaces were also changed to gas instead of wood logs. This club is a promising prospect for furnishing hot water throughout the building, including the swimming pool, which calls for a storage system.

Personal Notes

ANGUS G. LEITCH, manager of the Washington County Gas Company, Johnson City, Tenn., has tendered his resignation to take effect Aug. 1.

SAMUEL BALL, district manager of the Michigan Light Company, Bay City, Mich., has been elected by the Executive Board of the Michigan Gas Association as a member of the board to fill the vacancy of A. L. Wilkinson, who has resigned.

THE INDEPENDENCE INSPECTION BUREAU, at 137 South Fifth Street, Philadelphia, Pa., has changed its name to the Independence Bureau.

ROBERT S. HARDY, for the past ten years in the employ of the Los Angeles (Cal.) Gas & Electric Company, has enlisted in the Engineer Officers' Reserve Corps at Los Angeles, with the rank of captain.

W. M. VAUGHT of the Bristol Gas & Electric Company, a Cities Service subsidiary, was elected one of the city councilmen of Elizabethton, Tenn., on May 10. At the same election, John Curtis, foreman of the same company, was elected magistrate for the Elizabethton district.

JOSEPH L. HENDLEY died recently at his home 918 Chapin Street, Beloit, Wis. Mr. Hendley, with his father, was one of the pioneers in Wisconsin utilities. His father founded the Beloit Gas Light & Coke Company in 1859, and Mr. Hendley went into the business as a boy and grew up with it. He was general manager at the time it was merged in 1906 with the Beloit Electric Light Company and the Beloit Water Works Company, to form the Beloit Water, Gas & Electric Company.

Societies and Associations

THE PITTSFIELD (MASS.) COAL GAS COMPANY'S employees association held its first convention recently in Red Men's Hall, on Eagle Street, at which about 100 were present. William C. Gleiner, president of the association, presided. Papers were read covering all branches of the industry. Shortly after 7 p. m. a dinner was served at the New American House, at which the women employees were present.

Construction Notes

New Apparatus at Danielson, Conn.

J. H. Burdick, superintendent, has informed us of a recent installation which has been made at the Danielson & Plainfield Gas & Electric Company's plant.

This is a new 3-ft. set with all the latest improvements, installed by the United Gas Improvement Company, and will operate 18 hours per day, in connection with the old works.

2000 Acres in Ohio Leased for Oil and Gas Development

Acting for the Ironton Portland Cement Company, Attorney Homer M. Edwards has been busy securing leases on land in Perry township, Ohio, for the purpose of oil and gas development. All the section of land in Perry township adjoining the land of the Portland Cement Company has practically been leased and in extent it embraces about 2,000 acres. The Cement Company has been drilling extensively on its own lands recently, thirteen holes having been sunk with varying success. The land of the following persons has already been leased: J. D. Hatcher, G. E. Harris, M. Edwards, Edgar Shore, Jennie Rhodes, Peter Meystedt, Margaret Delawder, Wm. Artrup, Henry Sparling, Dan Sparling, C. A. Steed, Ed. Crabtree, Dillon Steed, John Hankins, M. D. Adkins, Solomon Hoskins, Mary Roseblock, Elias Jenkins, Lewis Hilgenburg, Clinton Webb, Geo. Graham, David Dunfee, Walter Markin, Cassius Hatcher, Samuel Sparling, Emily Steed.

Changes at Meriden, Conn., Display Rooms

Loucks & Clarke have the contract for alterations at the Wallingford Gas Company headquarters, Center Street, Meriden, Conn. The entrance has been changed to the east and a large front window installed, this being dropped a foot below the former location of the smaller windows.

New Gas Plant at Fairmount, W. Va.

The Hope Gas Company has started construction of a gas-producing plant near Fairmont, W. Va., to have a capacity of 15,000,000 cu. ft. a day.

Last Shipment Made on New Hawaii Plant

Shipment of the last unit of the first complete gas plant to be manufactured on the Pacific Coast was made recently by the Baker Iron Works of Los Angeles to the Hilo Gas Company, Ltd., of Hilo, Hawaii. This plant, which is of a design known as the Berkley twin type oil gas generator, was designed by J. M. Berkley of Los Angeles, who is in general charge of construction for the Hilo Company. The building that is to house the plant is of structural steel and galvanized iron and was built at the Baker Iron Works with the rest of the plant.

The plant will supply gas to 10,000 persons and is built in duplicate, so that if any part becomes disabled, or a breakdown occurs, the duplicate unit may be brought into service, thus avoiding the delays that are incident to such mishaps.

The total cost of the unit is $75,000. Shipment was begun some three weeks ago and a crew of Los Angeles mechanics is now on the islands assembling the parts as fast as they arrive. P. C. Beamer, president of the Hilo Company, is spending a few days in Los Angeles looking after details.

Mr. Berkley, who is in charge of construction, states that another plant, similar in character and of like capacity—250,000 ft. of gas per day—will shortly be started in this city for the island of Maui, one of the Hawaiian group. This plant will serve two small cities, the combined population of which is 10,000, and will cost approximately $75,000.

A number of similar projects, but on a larger scale, are about to be launched in South America, but definite details are lacking.

Plant and Main Extensions in Fond du Lac

The Eastern Wisconsin Electric Company has purchased the site for a new gas plant in Fond du Lac and is now actively engaged in hauling material to the site of the plant, according to a statement made recently by Joseph H. Brewer, president of the Eastern Wisconsin Company.

The new plant will be located south of West Johnson Street on the east bank of the river on the land purchased by the electric company some time ago. It is bounded on the west by the Soo tracks and spur tracks are already being constructed to the site.

The new gas holder, which was ordered from the Stacey Manufacturing Company some time ago and is now ready for shipment, will have a capacity of one-half million cubic feet.

Equipment for an entirely new plant of the most modern type, with vertical retorts has been contracted for with the United Gas Improvement Company of Philadelphia, and will be erected as rapidly as the apparatus can be manufactured and sent here. It is expected that the new plant will be in operation within ten months.

The Eastern Wisconsin Electric Company has also added two new benches to its gas plant on Macy Street, Fond du Lac, Wis., which will increase the capacity about one-third. The plant will now be able to produce daily from 250,000, the point of lowest consumption, to 300,000 cu. ft., or the point of highest consumption.

The company is also engaged in extending its gas service mains, removing mains which are now too small for the growing patronage, and replacing them with new and larger pipes. A 10-in. main is being laid on Linden Street, south from Western Avenue to Tenth Street, east on Tenth to Center, south on Center to Eleventh, east on Eleventh Street to Marr, and south on Marr to Twelfth. At the corner of Twelfth and Marr a 6-in. main leads east on Twelfth to Ellis, north on Ellis to Eleventh. Openings are left at Eleventh and Ellis and Twelfth and Marr for extensions. Intersecting mains are also connected up to give increased volume and pressure to the old mains.

On Linden Street a 3-in. main is being replaced, also a 3-in. on Center, a 4-in. on Eleventh and a 3-in. on Twelfth.

New Boiler House to Be Erected

The St. Paul Gas Light Company recently secured a permit for a two-story brick boiler house, costing $16,000, on the south side of St. Clair Street, between Archer Street and the short line, St. Paul, Minn.

Producer Gas Plant Installed by Lime Company

A producer gas plant and five new steel kilns are being installed at Marblehead, Ill., by the Marblehead Lime Company. This new gas heating system with the steel kilns will take the place of the old fires of coal and wood and the old stone kilns which have stood for fifty years. It is the modern way of getting intense heat and requires less labor to operate than the wood-burning fires which were built in each kiln.

The gas is made in a cylindrical furnace and then forced into the various kilns where it burns the lime stone rock which has been dropped into the kiln from the top. The furnace is supplied with coal once a day. In this way one fire, by making gas, supplies the heat for all of the kilns.

Mr. Harvey of Quincy, Ill., has erected producer gas plants for Armour, Van Camp, and other large manufacturers throughout the country. He says that the limestone rock near Marblehead is of high quality. The layers of rock were formerly the beds of the inland ocean which occupied that part of the United States before the elevation of the land as proved by the perfect impressions of sea ferns and petrified clam shells in most any piece of rock.

Contract Awarded for Bellefontaine Plant

The Board of Control at Bellefontaine, O., decided to accept the proposition of the Gas Machinery Company of Cleveland, to furnish the machinery for the new Bellefontaine gas plant at $58,888. The contract will be signed at once.

As the building has to be made to fit the machinery, the next step in securing a new plant for Bellefontaine, is to prepare plans and erect the building. The Cleveland Company will be able to furnish the machinery in from eight to ten months' time.

Messrs. McCracken and Gamper, of Columbus, special engineers engaged by the city, were present at the meeting. They will prepare the plans for the new building at once.

The new plant will be a coal gas plant and will be of much larger capacity than the present one.

Newburyport Main Extension

Employees of the Newburyport (Mass.) Gas & Electric Company have recently laid a large main from Pleasant Street into the Alexander block, entrance being into the basement of the store occupied by Boyd & Knight. From this main connections will be made with pipes leading to all other parts of the building, thus reducing to a minimum any future disturbance of the street for repairs on gas pipes.

Lehigh Company to Build Another Holder

The increased consumption of gas in Lansford, Coaldale and Summit Hill, Pa., has compelled the local gas company to contract for the erection of another holder with a capacity of 100,000 cu. ft.

New Oklahoma Distributing System

The Grand River Gas Company of Claremore, Okla., has just completed the installation of a gas distributing system in Sallisaw, Okla.

This is in line with the extending and reaching out policy of this company and many will benefit by this new extension. This journal is indebted to G. W. Fry, vice-president and general counsel of the Peoples' Service Company for the foregoing information.